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[OFFICIAL.]

Notice of the Annual Meeting of the New England Association of Gas Engineers.

BIRMINGHAM, CONN., Jan. 25, 1888.

The Eighteenth Annual Meeting of the New England Association of Gas Engineers will be held at the Parker House, Boston, on Wednesday and Thursday, Feb. 15 and 16, 1888. The meeting will be called to order at 10 A.M., Wednesday, by the President, Mr. John P. Harbison.

It is hoped and believed that the proceedings of this meeting will prove as interesting as any that have preceded it. The following papers have been promised:

"Introduction of High Candle Power Burners," by H. A. Allyn.

"A New Way of Utilizing Ammonia Liquor," by C. J. R. Humphreys.

"A Vagary of Naphthaline," by W. H. Snow.

"The Running of a Small Gas Works," by J. R. Todd.

Report on "Candle Power and Illumination" by the Committee, C. F. Prichard and R. B. Taber.

In addition to the above, partial promises have been received from several gentlemen that they will present papers, so that probably the above list will be increased somewhat by the date of the meeting.

The Committee appointed at the last meeting to revise the Articles of Association have reported, and a copy of their report will be placed in the hands of each member early next week.

Persons eligible for membership and wishing to join the Association will please send their names to the Secretary at once.

Any member of the Association wishing to have any particular subject discussed will please notify the Secretary, who will in turn notify the members of the Association of the same, so as to enable all to come prepared to discuss the subject more intelligently than otherwise would be possible.

CHARLES H. NETTLETON, Secretary.

SECRETARY NETTLETON'S REMINDER.

As will be seen from the official notice which heads this column, the Mother Association once more summons her members to meet, in pleasant controversy, at the Parker House, not far from the pulsing center of the busiest spot in the grand old Bay State's busiest and handsomest city. It will be at once reassuring and pleasing to the members of this sterling body that their eighteenth annual conclave is to be enlivened by the presentation of at least five subjects that differ so widely in the nature of the matter to be treated of, although it may be truthfully asserted that each of the five is sure to attract the undivided attention of those who are to discuss them. First, in the order written down by the Association's scholarly Secretary, comes Mr. H. A. Allyn's paper on the "Introduction of High Candle Power Burners;" and while we are yet totally in the dark as to what side of the argument the mentor of Cambridge has chosen to align himself, we venture to hint that the good policy of the proceeding will receive strong confirmation from his analysis of the whys and wherefores connected with the proceeding. Mr. Allyn having been for years a prominent spirit in the power guiding the mechanism of a liberal and stout-hearted Company, we feel that we are not far out of the way in expecting facts and figures which will strongly corroborate the matter-of-fact, but none the less impetuous, argument made on a similar theme, by Frank S. Richardson, of North Adams, Mass., at the '87 meeting of the Association. Being thoroughly aware of the danger incurred by assuming the *role* of a prophet, we nevertheless confidently put on the robe this time, and wear it with the understanding that our fall from grace shall be both sudden and pronounced should it turn out that Mr. Allyn espouses the reverse side of the argument. But, taking heart even in such dire extremity from the queer but certain understanding that misery is not averse to company, many will wear sackcloth with us then; for if staid and sober Cambridge, where everything is measured at its proper worth, refuses to acknowledge the value of high candle power burners, to whom can we appeal for comfort and assurance. Luckily, the prophetic mantle is of small moment in an attempt at solv-

ing how three of the other promised contributions are to be considered. Mr. C. J. R. Humphreys, who—and we congratulate ourselves that such is the case—is no stranger in a literary way to the fraternity of the East, and the entire country as well, can be depended on for an interesting thesis on "A New Way of Utilizing Ammonia Liquor;" a question concerning which our store of gas literature may yet be said to hold many empty shelves. Passing on to No. 3 on the list, we are confronted with a promise from Mr. Snow, of Holyoke, that another "Vagary of Naphthaline" is to be added to the very many freaks of that gruesome article which already enrich our book lore; but which, alas! at the same time impoverish our gas, and enrage our consumers, with a like effect on ourselves. But since not the least interesting portion of the fiction writer's compilation is that allotted to the portrayal of the dangers passed through by virtue in unmasking the arts of the villain, we can welcome Mr. Snow's promised revelation anent the latest vagary of the gas man's bugbear, for a vagary unmasked is like unto a villain foiled. There can be no gainsaying that Bro. Todd's remarks on the "Running of a Small Gas Works" will appeal with direct force to a wide circle of interested listeners, since by far the larger proportion of the fraternity (considered in numerical relation to the whole) in this country labor in similar fields. His Natick experiences, where a thriftily-managed gas plant has been operated with profit to its owners, and with liberality to the consumers, warrant us in saying that his conclusions, and the record of the result of his particular plan of action as well, can be trustily followed by those now inclined to waver in the struggle. Next comes the report from the special committee appointed last year to consider the vexed question of "Candle Power and Illumination." The Committee being well-qualified to take up this investigation and prosecute it to a satisfactory termination, why nothing else save that which is valuable can be the result of their researches.

Perhaps some of the theories so boldly avowed before the last meeting of the American Association may suffer somewhat from conflict with the findings of the Eastern toilers in this hitherto, and we fear hereafter, unsatisfactory field; but the smoke of conflict may be counted on to purify, and eventually brighten, the atmosphere of a subject clouded in doubt. Last, but not least, indeed not far from the bandmaster's ranks, for in reality it is first, comes the inaugural message of President Harbison. And mention of his name vividly recalls to us the knowledge that but a little more and the occasion of the New England gathering would be one of fasting rather than feasting. However, the dangers of the past, when successfully surmounted, but whet the appetite to enjoy the security of the present, hence we may be merry, for the King lives. It goes without saying that the "dollar gas" man will be heard from in no uncertain way.

One odd thing in connection with the set list of papers, as least so far as we now have cognizance of, is found in the fact that all of the contributors are residents of the Bay State. And as all of the literary talent of the Association is not centered within that Commonwealth, we hope to see, as intimated in the official notice, that those who are likely to swell the programme will divide the honors with her.

Taking one thing with another, we are inclined to assert that Secretary Nettleton's belief, so modestly expressed, that "the proceedings of this meeting will prove as interesting as any that have preceded it," will be more than realized.

THE VALUE OF A STATE CONTRACT.

To begin with, the value of such a contract is *nil*, at least in the State of Ohio; although a like estimate may with reason be made in regard to the binding force of similar documents in other Commonwealths of the Union. The latest illustration of the ease with which contracts between the State of Ohio and the stockholders of manufacturing corporations can be fractured at the will of the lawmaking power is afforded in a decision rendered some days ago by the occupants of the Cuyahoga county Circuit bench; and, in order that their names may not be unknown to the gas fraternity at large, we beg leave to say they are called respectively Baldwin, Upson and Haynes. When the Cleveland Gas Light Company took shape, in the persons of "B. Barker, G. Warren, and their associates and assigns," the State, and subsequently the local authorities, having specified under what conditions the Company might occupy the streets, lanes, etc., of the city in order to supply gas to the citizens and the city, went on to say: * * "shall furnish such quantity of gas as may be required by the City Council for public lamps, at a price not exceeding the prices paid either in Cincinnati [Ohio] or in Buffalo, N. Y., * * and *shall* charge the inhabitants of said city *not to exceed* $3 per thousand cubic feet." The Company not only kept its part of the contract, but in most generous spirit, and in accordance with sound business policy, gave the citizens, from time to time, the benefit of material reductions from the sales rate that it might charge under its charter. In the meantime, but some years after the formation of the Cleveland Company, the State of Ohio enacted a statute which authorized the "Council of any city or village, in which gas companies, or gas light and coke companies *may be* established, are hereby empowered to regulate from time to time the price which such * * companies may charge for gas, etc.," and this enactment was seized on in 1887 as pretext by the Cleveland City Council to oblige the Cleveland Company to sell its gas at the rate of $1 per thousand, although that corporation was, and had been for several months supplying gas to the people at a charge of $1.25 per thousand; or $1.75 per thousand below that which it had a right to obtain under the original State and city grants. The Company refused to accept the city ordinance, whereupon through *quo warranto* proceedings the argument as to the merits of the case was transferred to the Circuit Court, who have decided in effect that the State has the right to modify its bargains, and that the Cleveland Company must sell its gas at the figure placed thereon by the Council. Judge Upson, who wrote the opinion, lays great stress upon the section of the original grant by which the Company is authorized to "charge not to exceed $3 per thousand." In this respect he says:

"It seems to us it would be giving a very liberal construction to that section to say that it provided not only that they should not charge more, but that they should perpetually [which is precisely what the law undoubtedly meant] have the privilege of charging as much as $3 per thousand feet. It is a condition imposed upon the Company that it shall not charge more than that sum per thousand cubic feet of gas in consideration of the privileges granted by the city, but not a stipulation on the part of the city that it will never exercise the power conferred upon it by statute to regulate and fix the price of gas in such a manner as to establish a lower price of gas than that named in the ordinance."

Believing that Judge Upson's sophistries, as given above, are so plain as to do away with the necessity of picking them out by any direct reference to them, we diffidently ask the learned Cuyahoga bench warmer what was intended by the law-making power of the State when, in the enactment relegating to Councils the right to fix the price of gas, it used the words "may be established?" Was there any doubt that the Cleveland Gas Light and Coke Company was in existence prior to the time that that enactment was passed? To our mind the State there reaffirms and admits the contracts made between it and those gas companies then in existence, and, by means of the knowledge so gained to it from the prior acts of such companies, simply sought to more strictly control those newer corporations which in due course of time would apply to the State and to the local authorities for power to embark in the manufacture and sale of gas.

The Annual Report of the Massachusetts Gas Commission.

From advance facts and figures contained in the third annual report of the Massachusetts Gas Commission, the following is gleaned. Reference is made to the change in the organization of the Board, Hon. Starkes Whiton resigning to take a place on the Savings Bank Commission. He was succeeded by the Hon. A. B. Coffin, of Winchester. During 1887, 64 gas companies were actively engaged in business in the State. The total valuation of the gas companies is $13,012,358, an increase of $798,590 over the valuation of 1886. A summary of the returns shows the total receipts to have been $4,635,388.61, against $4,472,333.93 in 1886, and expenses of $3,031,224.16, against $2,931,517.70 in 1886. The taxes paid were $231,708.92, an average of 10.16 cents on each thousand feet of gas sold, an increase of $10,760.69 over the previous year.* Twenty-four companies have reduced the price of gas. The entire capitalization of the companies in active operation is $11,944,522; the assessed valuation is $12,636,208. The average price to consumers of 20 companies making more than 30,000,000 feet each, is $1.586 a thousand; of the rest of the coal gas companies, $2.168, an average for all of $1.659. The average price for oil gas is $4.13. The average price in 122 cities in the United States and Canada (omitting those in this State) is $1.83. There has been an increase of 5,608 in the number of meters used, and of 22,332 lights during the year. The number of public lamps had decreased 1,093, due to the growth of electric lighting. The violations of the law found were in Worcester, where the fine imposed was paid, and in Cottage City and Athol, where proceedings to enforce the penalty have begun.

By chapter 382 of the acts of 1887 the Board was given supervision over the electric lighting companies. There are 56 companies engaged in supplying electric light, and four others were incorporated during the year. The practice which many companies have followed of procuring their charters outside of the State is condemned. Four gas companies during the year were authorized to supply electric light, after hearings by the Board. Three petitions for similar permits are pending, and the Board suggests the advisability of more clearly defining the corporate relations which should exist between the two important methods of supplying light.

*In 1886, 9.4 cents per M.

New Method for Removing Sulphur Compounds from Coal Gas.

[At the last ordinary meeting of the London Section of the Society of Chemical Industry, Dr. J. J. Wood and Mr. A. G. Salamon presented a paper on the above-named subject. Our report of same is taken from the *Gas World*.]

Mr. Salamon, who read the paper, said purification of coal gas was always regarded from two points of view—a necessity and a difficulty. Although Parliament had laid down certain permissible limits of impurities, within which gas companies might work, it had not ventured upon the demand of their total removal, which at present was impossible. Even as at present carried out gas purification was a matter of great expense. Out of many processes devised the only one which was conceded general favor was that which involved the use of oxide of iron in dry purifiers. The carrying of the oxide to the various gas works in England constituted a considerable item of expense; and experiments in the laboratory showed that there was a small loss of weight in the ore during the process of sulphur absorption. The process demanded the attention of experienced hands, otherwise complications were likely to arise which would greatly interfere with its working. This was more especially the case in small gas works. On the whole it should be admitted that the process had yielded good results, and the public and the gas companies owed a deep debt of gratitude to the inventor. But the authors of the present paper contended that it was an expensive process. If they took the average cost of a ton of ore at 30s.—certainly not an exaggerated price—and admit that after twelve revivifications it would not, upon a working scale, take up more than 50 per cent. of sulphur, then it would require two tons of ore to take up one ton of sulphur, the result being that it was generally equivalent to pyritic sulphur, with this exception, that whereas the ordinary pyritic sulphur might, and generally did, contain arsenic, the sulphur that was obtained from spent oxide of iron was free from arsenic, and therefore white instead of colored sulphate of ammonia was obtained; and the result was that it fetched 1d. an unit more than would be obtained for pyritic sulphur. In other respects it was in every way comparable to pyritic sulphur. Now, after the ore had been roasted it could never again be used in the purification of coal gas, and could only be regarded as valuable for the quantity of sulphur it contained. Hence, if two tons cost 60s. they were equal in value to one ton of pyritic sulphur. Taking the pyrites at 4½d. per unit, and assuming it contained 48 per cent. of sulphur, certainly it was fair to deduce that the value of this ton of pyritic sulphur was 38s. Now, to that add 1d. an unit for freedom from arsenic, that would find a value for the ton of sulphur of 46s. These figures were exclusive of the cost involved in revivification. Sixpence was a very modest estimate for two handlings of each ton; and in each case to produce an ore containing 50 per cent. of sulphur, this would bring the prime cost of two tons necessary to obtain one ton of pyritic sulphur up to 72s., in which case every ton used for burning involved a loss to the gas companies of 26s. That, it must be admitted, ranked as a by no means small item in the cost of gas purification.

Carbon bisulphide and other sulphur compounds were hard to extract owing to the difficulty of effecting a suitable union between sulphur bodies and any known available compound. The method now adopted was theoretically interesting, but practically unsatisfactory. Carbonic acid and carbon bisulphide presented great analogy in chemical affinities, and it might be accepted that if carbonic acid had an affinity for the oxide of a metal, carbon bisulphide had a similar affinity. Advantage was taken of this fact in gas purification, lime sulphide being the compound selected for forming a combination with carbon bisulphide, and probably some other sulphur bodies present in the coal gas. Lime sulphide had the advantage of being easily made, and sulphuretted hydrogen was unfortunately sufficiently abundant in gas works to render its production cheap. But although carbon bisulphide possessed the affinity, it was by no means strong and energetic; and hence, though the coal gas passed over a large surface of lime sulphide, it was not able to extract the whole of the sulphur compounds. The quantity extracted was greater in summer than in winter—tending to show that the temperature played an important part. The sulphur could not be recovered in a manner commercially profitable; therefore no serious attempt was now made by gas companies to recover sulphur by roasting, and the whole of it was regarded as refuse which constituted the well-known "Blue Billy" of gas works. Moreover, calcic sulphide, when once charged, could not be again used in sulphur recovery. This "Blue Billy" was a terrible nuisance, not only to managers, but to those who lived in the vicinity of the works, because of the foul smells it emitted when exposed to the air. The disposal of "Blue Billy" was a matter of difficulty; it was used for manurial purposes, but at a nominal price.

The net result of all this process of gas purification left much to be desired. Now, if a substance could be obtained which contained the ingredients necessary for the elimination of carbonic acid, sulphuretted hydrogen, and carbon bisulphide, at one operation, it was clear that a step in the right direction would have been taken. Its value would be enhanced if it were in a state of unusually fine sub-division, and if it were possessed of far greater affinity for some of the gaseous sulphur compounds than was the case with bog ore oxide. If it did not involve the erection of new plant, if it allowed the utilization of existing purifiers, if it did not affect the illuminating power of the coal gas, if it could be used in the dry state, and did not lead to noxious fumes, and if it were obtainable at a price which would permit of a considerable economy over the present system of working, certainly such a substance merited the careful consideration of those concerned in the manufacture of coal gas. The authors of the paper believed that the compound about to be brought before their notice was possessed of all these properties. At present they were engaged on a series of practical experiments which would determine its commercial value. They could not, however, publish the results until they were absolutely complete. They had, however, every reason to be satisfied with the experiments so far as they had gone, and believed they would meet their most sanguine anticipations. They had been guided by the importance of employing dry material, because they were aware of the inconvenience attaching to the use of liquid. After experiments they had elected Weldon mud as most suitable. They did not use it in the ordinary state because of the amount of calcium chloride it contained, and which rendered it impracticable. Its removal by suitable washing was not difficult of accomplishment, and was already effected on a large scale in the process of the purification of sulphate of alumina from iron. In the ordinary method of washing they had been enabled to reduce the calcium chloride to 3 per cent., which would, as far as he could judge, make it ample to meet all requirements. After experience of many samples they found that it retained its energy and activity. He produced a sample of the mud, which might easily be broken up and reduced to a physical condition very similar to that exhibited by bog oxide. It then consisted of a mixture of hydrated oxide of calcium and manganese. It was very well known to alkali makers that the composition of this Weldon mud might be determined within very wide limits, and they had reason to believe that a mud of the composition of $CaOMnO_2$, which would be the best for their purpose, could be made. The reason they washed out the calcic chloride from the mud was very apparent. Apart from the fact that it deliquesced, it had been found in working, on a large scale, that it was apt to form a glaze over the manganese oxide and calcic hydrate, and to retard the absorbing action of the mud. By washing until the calcic chloride was reduced to 3 per cent., they found they obtained an extremely good working composition. He referred them to the following table:

Composition of Prepared Weldon Mud "A."

MnO_2	28
MnO	9
CaO	11
$CaCl_2$	3
H_2O	46
Insoluble	3
	100

The mud, of which that was a specimen, was practically a bye-product from another process in which Weldon mud was employed. They had every reason to believe that such a mud could be obtained at a very cheap rate indeed. [Mr. Salamon then conducted an experiment by which he showed that great heat was generated by the passage of sulphuretted hydrogen through the mud in a tube, whereas bog ore would merely have created warmth, and that not the slightest odor was emitted from the top—facts testified to by the President.] If this process of using the Weldon mud proved eventually successful, the nuisance of "Blue Billy" would be done away with. [Mr. Salamon conducted a further experiment, showing the affinity of Weldon mud for sulphuretted hydrogen.] It might be said that the intense heat caused might lead to such a reaction as to fire the Weldon mud in the purifier, and melt the sulphur—as, indeed, did sometimes happen in the case of bog oxide—and that when it was once melted, of course, the reaction would be spoiled. They had worked with some tons of material upon gas containing between 70 and 80 per cent. of sulphuretted hydrogen, and they had found no such firing taking place. They attributed that to some extent to the fact that the other 25 per cent of gas contained carbonic acid; and in the case of coal gas such a contingency could never possibly happen, because of the high specific heat of the compounds of coal gas, which would, of course, always exert a cooling influence upon the gas itself. It might be argued

that hydrated calcic oxide was the efficient agent in this process, or that, at any rate, it played an important part in taking up the sulphuretted hydrogen. They had passed carbonic acid through the Weldon mud until they had ample proof, by examining the outlet gas, that carbonic acid had thoroughly saturated the material, which showed its affinity and energy for that compound. It might be argued that they simply substituted manganese oxide for iron, but it was easily proved that the energy of bog oxide was not to be compared to that of Weldon mud, for the heat developed was remarkably intense. Again, Weldon mud exposed to a stream of sulphuretted hydrogen required a much longer time to become saturated than bog ore exposed under exactly similar conditions. And as to the question of revivification, the mud, after having been saturated with sulphuretted hydrogen, could be thrown on to the ground, if necessary, and there allowed to revivify. The manganese sulphide was acted upon, the sulphur was precipitated, and MnO_2, manganese oxide, was again produced. That could be kept on until they got the Weldon mud thoroughly charged with sulphur. They had been able to get about 80 or 90 per cent. into the Weldon mud with 5, 6 or 7 revivifications. With the bog oxide of iron they had to take 12 revivifications to get 50 per cent. of sulphur. Bog oxide lost a little in weight by the passage through it of sulphuretted hydrogen; Weldon mud gained enormously in weight. In the first revivification it gained 16 per cent.; in the sixth, 52 per cent.; so that in any experiments that correction must be made before making comparison between the two.

Comparison of bog ore with Weldon mud; sulphurized five times and revivified for one hour each time:

100 bog ore (34 per cent. Fe_2O_3) took up 27 S.

100 Weldon mud (28 per cent. MnO_2) took up 61 S.

The two substances had been charged under exactly similar conditions. If the result showed that Weldon mud was more active and required less time in which to revivify, so much the better for it. The results shown in the table had been confirmed by experiments in the laboratory of the works where the process was now being tried on a large scale. Up to this stage the gain was immensely in favor of Weldon mud, but it was after that stage that the advantages became even more apparent. The following were the results of six revivifications of Weldon mud:

Sulphurization of Weldon Mud, "A."—Sulphurized and Revivified. Sulphur per 100 of Mud.

	By CS_2.	By Acid.
1	19	25
2	37	43
3	42	53
4	45	58
5	57	66
6	60	70

These figures showed a considerable gain over anything that could be done with bog oxide of iron, and they believed it was possible to effect a much greater charge. With reference to the elimination of carbon bisulphide and other sulphur compounds, it was more difficult to quote figures unless they were derived from experiments made upon a large scale, and these were not yet completed. They had made some crude tests with the gas sent away for consumption, and compared with bog ore they had obtained 25 per cent. in favor of Weldon mud of carbon bisulphide and other sulphur compounds. With Weldon mud, as with bog oxide of iron, the trouble of revivification might be obviated by passing air through the purifiers. The process admitted of a number of variations to suit the convenience and requirements of different establishments; but this much was evident, that if the process was destined to succeed—as they believed it was—it would effect a much better purification of gas than was possible by the method now used. The material employed would be far more energetic in action, and no new plant would be required, no bye-products would be produced giving off foul-smelling sulphurous gases when exposed to the atmosphere. When the mud was fully charged it might be treated in a variety of ways with a view to the recovery of sulphur, and the transformation of the residual into a fresh and active Weldon mud. In one experiment they made the roasted product gave this result:

One hundred parts of Weldon mud, "A," after sulphurization, took up 70 parts of S, and on burning gave 75 parts, having the composition—

MnO_2	15
MnO	31
CaO	15
SO_3	23
Insoluble	14

The whole question was one of the hire of Weldon mud from the bleach maker, and he could only say that the quotations they had received for its delivery showed that the process was not only feasible but practicable. They simply got the Weldon mud in a suitable state to throw into the purifiers; they sent it back to the bleach maker, who got the benefit of their sulphur—which was precipitated in a pure state, and worth £7 a ton—and who merely charged so much for hire. They had received a very high practical opinion that the process was feasible. Weldon mud might be passed through a complete cycle of operations, and might be again regenerated for use in gas works; and when they gained further experience of it on a larger scale he should be glad of the privilege of communicating the results to the Society.

Discussion.

The President remarked that if the process only fulfilled its promise it would be of very great advantage, and constitute another triumph of chemistry, making the most disagreeable products into valuable sources of revenue. If what was now wasted, or imperfectly dealt with, could be restored to commerce as pure sulphur, it certainly would be a triumph of utilization equal to any that had taken place in any industry.

Mr. F. Mead, Sutton, said the reader of the paper seemed to think that the present method of purification was a more costly process than it ought to be, but 2d. a ton of coal carbonized was an extremely small cost, being something like only the fifth of a penny for every thousand cubic feet of gas. The question was, would this new process pay? For himself, he had come to hear the paper with the hope that the new process would eliminate entirely the sulphur compounds—a result they were all anxiously looking for. However, he understood that this new process was capable of reducing the sulphur compounds in ordinary gas by 25 per cent. That meant that it would reduce the 8 grains left in London gas by 2 grains. As to the admission of air into the purifier, that was what pretty nearly all gas men were already doing. He knew of a purifier, 18 feet square, which, since it was last charged, had passed 25,000,000 cubic feet, so that the labor of changing the oxide was at present very small. A good deal would be required to induce them to change from the present system, which was so extremely cheap. If they could eliminate the whole of the sulphur compounds, gas companies might be prepared to pay something for purification; but if it was put to the consumer whether he would have 2 grains less sulphur in his gas and pay 2d. more, or have it as at present, he thought the consumer would be prepared to keep both his twopence and the 2 grains.

Professor Heaton characterized the process described by Mr. Salamon as interesting, but refrained from making any observations of a critical character until he was possessed of further information showing results on a large scale.

Mr. C. E. Groves said it was important to know whether, when, after ultimate revivification, the mud was sent back to the bleach works, the whole of the manganese was returned as oxide of manganese, or whether a portion of it was sulphate and the rest oxide. If it was sent back as sulphate of manganese it would certainly not be worth the manufacturer's while to deal with it.

Mr. Campbell called attention to the cost that would be incurred in carrying Weldon mud to and fro between Lancashire and the Tyne and other centers.

Mr. Newlands said it was possible to get more than 50 per cent. of sulphur by means of the bog oxide of iron process.

Dr. Squire, drawing attention to the tabulated figures relating to revivification, asked if the torpidity disclosed by the central figures could be accounted for.

Mr. Salamon, in reply, said he could not help thinking, when he heard Mr. Mead speak, that there was not the slightest need for any new process whatever. But he thought he had a vivid recollection of an action brought by the inhabitants against the Crystal Palace Gas Company, compelling them to take more sulphur out of their gas. He also recollected having read—perhaps Mr. Mead was acquainted with the fact—that gas companies were compelled to remove the corpse of "Blue Billy" in the dead of night. Further, the act of Parliament fixed the limit at 22 grains of sulphur in winter and 17 in summer. If Mr. Mead had no difficulty in getting his gas down to 8 grains, why had the Legislature fixed 22 grains? They had heard of a process, and perhaps Mr. Mead had also, in which they revivified by passing air through the purifiers, and it was claimed that they had not opened these purifiers for two years. He did not believe they had been opened yet, and they were still going on. He should not say a word disrespectful to that process, but he did not believe there was a large gas works throughout the country which kept their purifiers half a year without opening them. He repeated, on the authority of one of the leading gas makers, that they could not get a working average of more than 50 per cent. of sulphur into bog oxide, and they could not get that without twelve revivifica-

tions. If they got more than 50 per cent., more than twelve revivifications were required. Inasmuch as they did not go beyond the twelve, it followed that it would not pay to do so. If the Weldon mud process succeeded in abolishing "Blue Billy," surely that alone would be a great advantage. As to the cost of the process, the quotations for hire showed that they would be enabled to effect a very large saving indeed. Mr. Mead said that it did not cost very much to purify at present. He did not think that gas companies could share Mr. Mead's sanguine view. He found that gas purification in London cost about ½d. per thousand cubic feet. The cost of purification to the Crystal Palace Company—perhaps as a result of the slight litigation they had experienced—had gone up to over 1d. He did not think that was altogether an insignificant item of cost. He could not say that they were going to take out the whole of the sulphur compounds; all he could say was that 25 per cent. more than was obtained by the existing method was the limit they had reached at present, and if in addition they abolished "Blue Billy," and produced a pure sulphur, he thought those results would commend themselves even to the commercial mind of Mr. Mead. With respect to the torpidity of the middle figures relating to revivification, they had simply set down the results as they obtained them, and they had by no means mastered all the details of revivification, having met with some very curious experiences.

Electrical Photometry.

By J. SWINBURNE, *Electrical Review.*

Candle power, as generally used, means nothing; and the candle power of a lamp strictly defined means the emission in a horizontal direction of a cylindrical carbon of the same surface held vertically.

This way of taking the candle power has the advantage of being simple, as most carbons are of circular section and horseshoe or double-loop form. If a horseshoe carbon is held flatways toward the photometer it gives out the same light in that direction as it would if it were stretched out into a vertical cylinder. The same holds good with a looped carbon, if the carbon is so thin that the part in front does not sensibly shade a part behind.

The most convenient form of photometer is the Bunsen grease spot. Candles are not used in practice as light standards. The Methven screen or the Harcourt lamp is convenient. The Methven screen consists of a Sugg's referee burner, with a screen between it and the grease spot, the screen being pierced with a small rectangular hole. Photometers with Methven screens are made with the standard burner on a moving carriage. This arrangement is faulty; the lamp ought to move while the standard remains fixed. The Methven standard is wrong when the screen is close to the grease spot. Before using such a photometer it is necessary to calibrate the standard. The first thing to do is to mark off the scale for the lamp. If it is desired to measure lamps up to, say, 50 candles, the far end of the scale is marked 50 and the scale is divided up, the numbers marked varying as the square of the distance from the grease spot. This can be done rapidly with the aid of a slide rule.

The pentane, or other standard lamp, is then placed on the mark corresponding to the light it gives. The Methven screen is then moved till it exactly balances the standard, and is fixed at that point. If any other standard is at hand, the referee's burner of the Methven lamp may be used. The screen is removed and the Sugg burner placed at a distance from the grease spot equal to that of the 16 candle mark on the other scale. The gas is turned up to the right height, and another gas jet of any sort is placed on the other scale and moved till it balances the 16-candle burner. The screen is now replaced, and the burner and screen are moved till they balance the jet, and fixed there. Of course it is not necessary to make the screen exactly accurate to the Methven sizes if it is calibrated in this way. Any Argand burner with a screen of the same sort as Methven's may be used and compared with a standard. The methods of calibration are accurate enough for ordinary work.

In installation work what is wanted is to be able to run the lamps as bright as possible without breaking them, so that they run at the highest efficiency compatible with economy in replacing. To get the best results it is obviously necessary that all the lamps should run equally bright—that is to say, at the same efficiency and same temperature. To make sure that the lamps all run at the same temperature they should be tested at the same efficiency—that is, the same candles per watt. Thus, unless the efficiency is stated, such an expression as 85 volt lamp means nothing, as a lamp might be run at any electromotive forces from 80 to 90, but would then run at different efficiencies. What are known as high efficiency lamps are simply small lamps tested bright; a similar lamp tested at a low electromotive force would be sold as a low efficiency lamp. After being sold the lamps might be run at electromotive forces different from those marked, and the so-called low efficiency lamp might be run brighter than the other, and would then really give a higher efficiency without getting credit for it. The efficiency is not a property inherent in a lamp, as many people seem to think; it depends only on the temperature at which the lamp happens to be running.

The photometer is, of course, provided with adjustable resistances, or secondary batteries may be used with switches for varying the number, for use in calibrating voltmeters. In incandescent lamp manufacture a wattmeter is used as well as a voltmeter and ammeter, as it saves a great deal of time; but for testing lamps, for instance, at an important central station the work can be done with only a voltmeter and an ammeter. The voltmeter should be put in shunt to the ammeter and lamp (not to the lamp alone), and the ammeter and the leads from it to the lamp should be without appreciable resistance. If their resistance is appreciable, the writer's method of compensation may be used. Part of the current circuit is wound backward round the voltmeter till there is no deflection when the lamp holder is short circuited, the voltmeter will then read the electromotive force on the lamp, though it is really not on its terminals. A fine wire in shunt to the ammeter is often convenient for winding these backward turns.

Before testing a lamp it must be decided what efficiency it is to be tested at. The writer generally takes .3-c.p.w. as the normal efficiency; some, however, prefer the lower efficiency of .25-c.p.w., or, taking it backward, 4 watts per candle. The lamp is put at the expected candle power, and run up by the switch till it gives 16 candles. The electromotive force and current are taken and their product multiplied by .3. If this gives 16 candles the lamp is running at .3-c.p.w., and may be labeled with the volts and amperes read. If too bright or too dull, a new reading is taken and new calculation made, and so on. A slide rule is convenient to make these calculations, but even then the process is very slow and tedious. The writer has designed a photometer scale which saves a great deal of labor. The index on the lampholder not only passes over the candle power marks, but stretches across a broad scale. This is marked out with parallel lines running along it marked in volts. Thus, for measuring from 40 to 120 volts there are 60 lines marked in volts. The tens and fives are made thick to be more easily seen. Curves, really parabolic, are drawn to represent amperes cutting the volt lines at points such that all the intersections opposite any candle power correspond to volt and ampere lines whose product is .3 of the candle power. Thus, suppose the lamp, as before, runs at 16 candles; the voltmeter is read and the ampere line intersecting the corresponding line under the lamp index is noted. Suppose it is 1.4 amperes; if an ammeter shows, say, 1.3 amperes, the lamp is running too bright, and so on. This method, of course, requires no calculations.

Lamps supplied by the makers to run together need not necessarily give the same light or take the same current, but it is absolutely necessary for good work that they take the same electromotive force at the same efficiency, so that they will all run at the same temperature.

If a lamp has a flat carbon a correction must be made. This is done best by opening one lamp and carefully measuring the carbon. The ratio of the surface exposed to the photometer to the surface that would be exposed were the carbon cylindrical is then calculated, and the Methven screen is moved forward a little to make the readings come right. The Methven screen, instead of being absolutely fixed, is made to move over a short scale. This scale is used for corrections for flat carbons, and for testing at efficiencies other than those for which the other side of the photometer has been graduated. The photometer can then be used for testing at any desired efficiency without the calculating scale having to be altered.

Testing lamps to see that they all run at the same temperature is not enough for installation purposes; the engineer also wants to know which lamps are best—that is to say, which lamps last longest at a given efficiency. People talk of the life of lamps in much the same way as they talk of their efficiency. The life of the lamp obviously depends on the way it is run and of the durability of the carbon. A good lamp on an installation where the electromotive force varies considerably on each side of the normal will not last as long as a bad lamp run on a circuit on which the electromotive force is kept constant.

No incandescent life tests of any value have yet been published. Tables giving lives, taken with considerable care and trouble, have appeared, but in all cases there have been slips and omissions that render the data valueless. Sometimes the lamps have been run at different efficiencies; mistakes have nearly always been made in taking the candle power, and the electromotive force has not been kept absolutely constant. We thus do not yet know what is the best efficiency at which to run well-made lamps.

It is not difficult to determine which of two or three types of lamp is the best. If the lamps are for parallel work, as is generally the case, two or more specimens are carefully tested at the same efficiency. If the electromotive forces required are not the same, resistance is put in series with those of low electromotive force till they can all be run together. They are then run in parallel and their lives noted. As this test may take a long time, and it may be inconvenient to get enough electromotive force to overrun them, it is a good plan to order a few lamps of slightly lower electromotive force than those in use on the installation.

In many cases it will be found that, instead of breaking, a lamp increases in resistance, thus protecting itself. A lamp that has increased in resistance may be regarded as broken, because such lamps are practically useless. If some of the lamps on an installation run dull they are practically useless, as it would pay better to replace them than to continue to run them. If many run dull, however, the chances are that the engineer will increase the electromotive force of the circuit to suit the dull lamps, so that the bright lamps break. If new lamps are ordered to replace those of the original electromotive force, they will be overrun. If lamps are ordered of higher electromotive force, the electromotive force needed on the installation gradually rises till the engine can go no faster. The result is that all the lamps on the installation are run dull, and therefore expensively. This is the reason why the lamps on old installations are generally run so dull; all the bright lamps have died out, and those in use are run dull.

A lamp that blackens may also be regarded as useless. People do not seem to realize what a little light a blackened lamp gives. It is strange that many engineers will buy what are called high efficiency lamps, and will then run them like hot hair pins, or blacken them till they give out something like two candles, still thinking they are getting high efficiency.

The Ether-Oxygen Lime Light.

By F. E. Ives.

[Mr. F. E. Ives read the following paper at a meeting of the Franklin Institute held December 21, 1887.]

The vapor of sulphuric ether has been found to give as good results as coal gas in the production of the lime light. As first employed for this purpose the ether was vaporized by heat, but this method has always been regarded as troublesome and unsafe. Mr. S. Broughton, of England, tried to improve upon it by dividing the oxygen supply and passing a small portion of it through liquid ether, where it became charged with ether vapor, which it then conducted to the hydrogen side of the jet. There were several objections to this method. The oxygen could not be perfectly saturated with ether vapor in this way, and in a cold room or with impure ether there was always danger of the flame retreating into the saturator; if this occurred, it was almost certain to either burst the saturator and throw the burning liquid about the room, or to force it back into the oxygen holder and produce a still more dangerous explosion. The passage of the gas in bubbles through the liquid also caused the light to flicker so badly that I imagine few operators would have tolerated it. Mr. Broughton sought to overcome the first objection by packing the mixing chamber of his jets with granulated pumice, through which the flame will not readily retreat; but this made it almost impossible to use the light at all in two lanterns connected through a dissolving key, and, of course, did not stop the flickering. Serious accidents resulted through the use of the wash-bottle saturator, and it was abandoned, after creating a general impression that ether could not be employed with safety. Mr. Broughton afterward used a saturator in which the oxygen was passed over the liquid ether instead of through it, and so stopped the flickering, but did not publish this method for some time. The first published improvement on the wash-bottle saturator was invented and patented by me in 1882. It consisted of substituting for the wash bottle a chamber packed with a porous material, which was saturated with the liquid ether and so arranged that the oxygen was charged with vapor without bubbling through the liquid. This saturator was also provided with a removable cap, which permitted the porous filling to be removed and dried out whenever it became overcharged with the alcohol and water which are always present in commercial sulphuric ether. With this saturator the oxygen can be perfectly saturated with ether, and is then absolutely non-explosive; the light is also perfectly steady, and can be used with perfect success for dissolving, provided that the jets have small tubes and mixing chambers, and the dissolving key a proper adjustment. It is also absolutely safe, if properly connected with the lantern and oxygen supply, because even with an explosive mixture in the saturator it is impossible to produce an explosion that will either damage it or throw out liquid ether. As originally placed on the market this saturator was provided with removable rubber caps, for which the present owners of the patent have substituted a metallic screw cap, which is made to fit ether tight by applying common bar soap to the screw thread.

The ether light, as produced with this saturator, is now employed by some of the best known lantern operators in the country, who are enthusiastic in its praise; but in spite of the success and enthusiasm of many, there are some to-day who affect to believe that its use ought to be prohibited as dangerous, and others who are either too stupid or too "smart" to manage it successfully. Members of the Franklin Institute have had occular demonstration of its success and convenience, as it has been used in illustrating most of the Institute lectures during the past year; but its greatest advantage lies in the extreme compactness and portability of the requisite apparatus. I will take the liberty to reproduce here some endorsements of the light by well-known men who have used it. Prof. Wm. A. Anthony says:

"With the same pressure of oxygen, the ether is better than the hydrogen. * * * In the qualities of steadiness, freedom from noise, etc., it is certainly equal to any lime light, and in convenience of manipulation, especially for a traveling exhibition, it is far superior to either hydrogen or house gas."

Dr. John Nicol says: "I have been closely identified with lantern work since 1853, and have used and experimented with almost every method of illumination and every variety of apparatus that have been introduced or suggested, and have no hesitation in saying that the production of an oxy-hydrogen light of the very highest class is obtainable with this saturator with absolute safety, and with less trouble than by any other device or apparatus that I have seen."

Notwithstanding the great success of this means for producing the lime light, and the important advantages which it offers, I have always recognized in it certain minor faults, which I hope to overcome in course of time, and my object in preparing this paper has been to call attention to some recent improvements I have made, which I believe will greatly extend the use of the light and increase its popularity. The first improvement is in the construction of the saturator, which is reduced in size yet increased in effectiveness. The second is in the use of petroleum ether (rhigolene), which gives the same light as sulphuric ether, but vaporizes at a lower temperature, costs much less, and contains neither alcohol nor water to accumulate in the saturator.

My improved saturator is in the form of a single metallic tube, 2 in. in diameter and 13 in. long, with a handle at the middle and a stopcock projecting upward at each end. A neck, like that of a bottle, projects from the screw cap at the end, and is closed with a cork for convenience in filling. The passage for oxygen is over 20 in. long, in the form of a zig-zag channel through the upper surface of the roll of porous material, and secures complete saturation of the gas with vapor. This saturator can be filled from a bottle in one minute, and is ready for use at once, or may be kept filled for any length of time. It will supply a pair of lanterns, connected by dissolving key, for two hours, continuously.

Petroleum ether costs only 30 cents a pound, which is less than half the price of sulphuric ether. It should be stored in a cool place and kept tightly corked. It is also necessary, when using it with oxygen from a cylinder, to use a valve that can be opened very slowly, because a very small amount of oxygen passing through the saturator will produce a very large flame at the jet; the Shaw valve, manufactured by Mr. Shaw, a member of this Institute, fulfills the requirements, and is already largely used in this city. Some special instructions for the management of the light in hot weather may also be called for. Upon opening the saturator in a warm room, a small amount of ether will vaporize spontaneously, and should be allowed to escape at the jet before turning on the oxygen supply; before the light has been run a minute the vaporization will have become perfectly regular.

In conclusion, I give it as my opinion that this improved means for supplying the hydrogen element is so much simpler and more convenient than any other, that it cannot fail to entirely supersede the use of hydrogen and coal gas when its merits shall have become generally known and appreciated.

The patentees of the device known as the "Duplex Fuel Oil Burner" assert that an exhaustive test, lasting for seven days, of the duplex burner was recently made under the boilers of the Cleveland (O.) city water works, where the average result showed that a trifle over 17 lbs. of water (at 212°) had been evaporated by each pound of oil consumed. The experimenters claim that no especially favorable circumstances existed during the test run. They also claim that a test made at the works of the Standard Oil Company, where the conditions were more favorable than at the water works, developed still better results.

The Robson-Pinkney Gas Hammer.

M. Albert Marnier, writing in *Revue Industrielle*, calls attention to the improvements that have been made in the Robson-Pinkney gas hammer, and regrets that this handy and economical instrument is not likely to make much headway in France because of the high rates charged for gas in the leading French cities, or where gas hammers would most likely be found useful. M. Marnier's objection seems to be a perfectly valid one when it is remembered that gas costs 30 centimes (.0558 cents) and even 40 centimes (.07740 cents) per cu. meter (35 cu. ft., 547 cu. ins.) in the country of Sadi-Carnot.

M. Marnier then recalls the fact that Mr. Dugald Clerk, at the last meeting of the British Association for the Advancement of Science, while speaking before the mechanical section of that body, gave a complete description of the Robson-Pinkney device, which the French commentator thus summarizes.

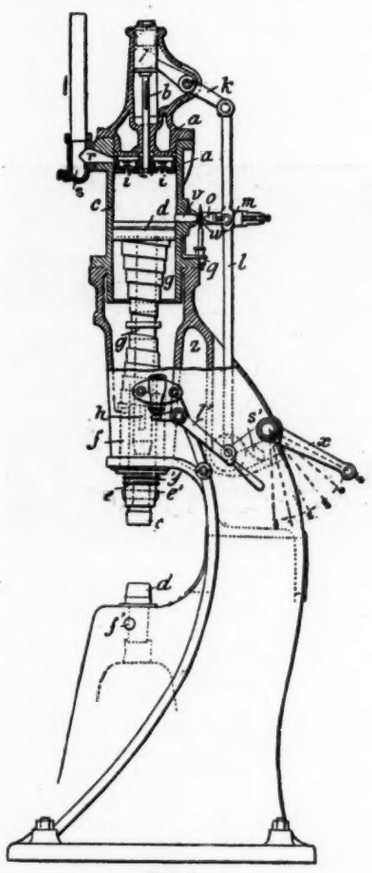


Fig. 1.

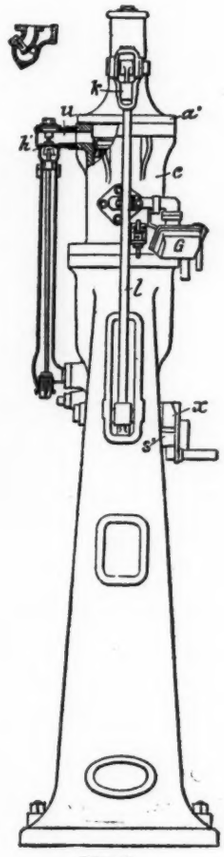


Fig. 2

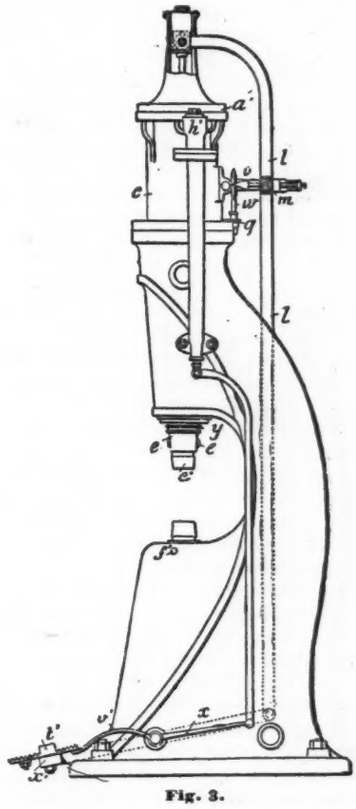


Fig. 3.

As in the ordinary steam trip hammer, the gas hammer depends on a vertical piston whose movements are controlled or determined by the manipulation of a lever which operates the machinery. The disposition of the anvil, the striking plate and its slide is also alike in both. The table below given enumerates the pieces which enter into the construction of the tool, as displayed in Figs. 1 and 2: *a*, piston for filling; *a'*, cap; *b'*, piston rod; *c*, power cylinder; *c'*, hammer head; *d*, power piston; *d'*, anvil; *e*, piston slide; *e'*, collar; *f*, guide box; *f'*, collar; *g*, spiral spring; *h*, collar for hammer; *h'*, partial escapement valve; *i i*, automatic valves; *k*, working lever; *l*, moving rod; *l'*, lever for valve *h*; *m*, roller; *o*, igniter; *r*, escapement orifice; *s*, escapement box; *s'*, angle block; *u*, partial escapement orifice; *v*, flame chimney; *w*, lighting burner; *x*, controlling lever; *y*, impact buffer; *z*, discharge chamber.

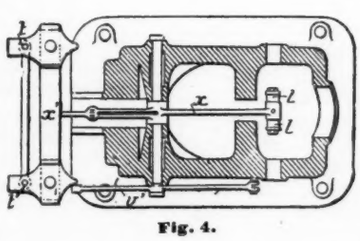


Fig. 4.

The cylinder *c*, it will be seen, contains two pistons, of which one, *a*, serves to load the proper compartment of the cylinder with the explosive mixture, while the other, *d*, transmits the impact of the explosion to the body placed on the anvil. Under the impulse of the spiral spring the stroke recoils, and, in order to avoid injury to the sliding box *f*, a buffer with spiral spring attachment has been located at an appropriate point.

An inspection of Fig. 1 shows that the charging piston is at the highest point of its course, a position which corresponds, when the machine is at work, with the admission of the explosive mixture between the two pistons. Inside the piston *a* two automatic clack-valves, *i i*, opening upwards, are located. The rod *b* moves in a socket adapted to receive the head of the lever *k*, governed by the movement of *l s'* by the hand lever *x*. In operating *x* the pistons *a* and *d* almost collide; or, rather, a space forming the explosion chamber is made between them. The angle box *s'* is intended to regulate the course of the lever *x* in both directions.

When the roller *m*, of the rod *l*, reaches the igniter *o*, which closes in proper time the chimney *v*, the permanent flame of the burner *w* ignites the explosive mixture at the appropriate time. The admission of the gas and air is provided for by means of a valve pierced with a single opening for the gas to pass from, two openings being allotted in it for the air feed.

Supposing the explosion to have taken place, the piston *d* is violently thrown back toward the anvil, and at once springs back, the recoil being chiefly attributable to the action of the spiral spring. At the same time the automatic ports *i i* open to permit the passage of the gas beyond the charging piston *a*. Because of this there is no danger that the explosion would lead to a violent contact between the piston and the bottom of the cylinder, for the pressure is instantly equalized on both sides of the displacing piston, which then occupies its highest altitude, corresponding with the position as shown at *x* in 5. In leading back the piston the rod *l* is forced downwards, and, as a consequence, the piston *a* is depressed. This uncovers the escapement port at *r*, and the waste gases pass through the ports *i i* into the opening at *r*, and thence into the flue *o*.

The pistons *a* and *d* being almost in contact, if, in ascending, *a* is brought by means of the lever towards 5, the balance of the gases of combustion remaining above this piston are crowded back, whereupon

the ports *i i* close automatically, and a very trifling portion of the gases remain compressed between the piston and the bottom of the cylinder. Nevertheless, the partial vacuum produced in the same time above *d* regulates the opening of the admission valve *G*, through which suitable quantities of gas and air enter, both mixing together on reaching the cylinder.

When the piston is at its highest point the escapement opening is closed, and the roller *m* permits the flame chimney to produce a new explosion. As soon as the escapement of gas begins the piston *d* is carried down from its upward course by the spiral spring. When the hammer is not being used the handgear occupies the position shown at 1, and the displacing piston is at the bottom of its course.

With a view to deaden the violence of the impact a device is located at *u* which permits of the escape of a portion of the explosive mixture. For this purpose a lever, *l'*, is so operated as to open the valve *h'*, fastened at *u* to the cylinder. The discharge of gas is made into the chamber *z*. By increasing or diminishing the gas flow the force of the impact may be modified at will.

The force of the stroke may also be reduced thuswise: The hand lever being always brought to 5 to produce combustion, if it is brought successively to the points 1, 2, 3 or 4, the quantity of explosive mixture admitted is diminished, the result necessarily being a greatly diminished stroke or blow.

As above described, two men are required to operate the hammer. If it is desired to work with one operator a pedal attachment (as shown in Figs. 3 and 4) is provided. Then the lever *k* is not used, and the rod *l* is bifurcated so as to grasp the displacing piston head and to connect it with the pedal *x*. This pedal is worked by the foot in the same general manner as the lever *x*, but much more slowly. The pedal is fitted with two sliding shoes, *t'*, either one of which can be used or not, according as the smith's foot presses on the lever *v'* for the purpose of closing or opening the valve *h*.

The English Coal Trade in 1887.

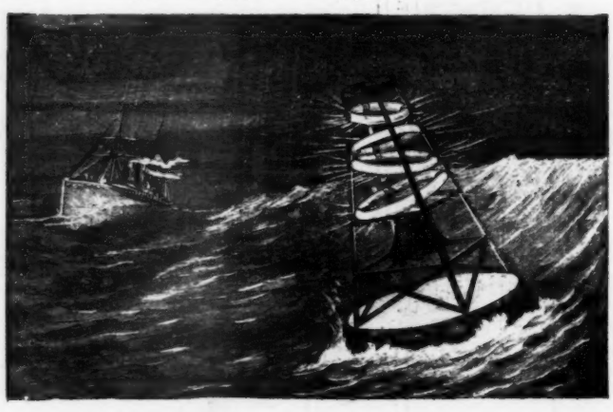
The *Mining Journal* in reviewing the state of the English coal trade for the past year complains that, from various causes, the production of coal during the twelvemonth, as shown by the returns so far to hand for the period under consideration, is not likely to exceed that of the previous year, if indeed it reaches it. There is certainly an increase, principally, strange to say, in the steam grades, of coal exported, but the depressed state of the iron trade throughout nearly the whole of the year, and the large number of furnaces out of blast, have told rather heavily on the consumption in connection with the industry which absorbs so far the largest amount of fuel. Coal for general manufacturing purposes, owing to the slackness which prevailed in the Lancashire, as well as other districts, was also in less request than in some previous years, and this had the effect of keeping prices down to a low and, in many instances, to really a losing point. In the early part of the year a strike on an extensive scale in the Newcastle district sent a good portion of the shipping trade, especially as regards hard varieties of coal, from the Tyne to other ports; and among the latter Hull and Grimsby were greatly benefited by the strike of the Newcastle miners, who, however, were obliged after all to resume work on their employers' terms. The strikers and their employers were also punished in common for their obstinacy, because, with the settlement of their differences, a large portion of the trade which had been diverted failed to return from the sections to which it had been diverted during the existence of the difficulty. In ordinary house coal the collieries in the North of England fairly maintained their position in the London market, although hard pressed by those sending from the inland districts by railway, and these will show an increase for the year, as compared with 1886, of something like 200,000 tons. With respect to the London trade, however, it may be said that the consumption of fuel has not increased *pari passu* with that of population, as was predicted or counted on by the last Royal Commission on Coal and Mining. High prices have led to the introduction of economical appliances, the increased employment of gas coke for domestic fuel, and greater care in the use of coal in the household; otherwise there would have been a much larger tonnage sent to the Metropolis than was the case during the last few years. The extension of the Metropolis in all directions, with additional yearly increase of miles of streets and houses, has not led to a corresponding increase in the quantity of coal imported to the order of the gas companies, showing that improvements on their part in carbonization methods have been steadily going on. The year closed with strikes at a few places, and a demand for an advance of 10 per cent. on miners' wages at a good many others.

One noticeable fact in connection with this great English industry is found in the fact that the production of coal has not gone on increasing from year to year, as was the opinion of many of the ablest English mining experts, including Professor Jevons, not so many years ago, ample verification of which assertion is to be found in the undermentioned figures giving the quantities raised during the last 12 years:

Year.	Tons.	Year.	Tons.
1876.....	133,344,800	1882.....	156,599,997
1877.....	134,610,700	1883.....	163,737,327
1878.....	132,810,900	1884.....	160,044,175
1879.....	133,808,000	1885.....	159,351,418
1800.....	146,969,000	1886.....	157,518,482
1881.....	154,186,300	*1887.....	156,850,000

Self-Luminous Buoy.

Geo. M. Hopkins, in a recent number of the *Scientific American*, notes that among the tried devices for rendering buoys luminous are lamps arranged to burn for a long time, phosphorescent mixtures, electric illuminators supplied with the current from the shore by means of a cable, and the more recent luminous paint, which absorbs light by day and gives it out at night. Compressed gas has been employed with great success, some of the buoys having been designed to carry six months' supply of gas, and to serve as light ships.



The engraving illustrates illuminating apparatus designed as an auxiliary to bell buoys and whistling buoys. It is based upon the generation of electricity by the agitation of mercury in a high vacuum or in gas of high tension. The self-exciting Geissler tube involves the same principle. The buoy represented in the cut is adapted to ring a bell by the rolling motion imparted to it by the waves. Advantage is taken of this motion to agitate mercury in the annular tubes placed in the upper portion of the frame of the buoy. The tubes are made very heavy and strong, and each contains barriers for causing friction of the mercury against the sides of the tubes.

To insure the action of one or more of the tubes at all times, they are inclined at different angles. A slight motion of the buoy causes the mercury to travel circularly in the tubes and generate sufficient electricity to render the tubes luminous.

Prof. Mendelejef's Theory about the Origin of Petroleum.

Annales Industrielles reports that Prof. Mendelejef has recently advanced the idea that petroleum is of purely mineral origin, and that the formation of it is going on every day. He has, moreover, succeeded in producing artificial petroleum by a reaction that he describes, and he states that it is impossible to detect any difference between the natural product and the manufactured article. His theory is as follows: Infiltrations of water, reaching a certain depth, come into contact with incandescent masses of carburets of metals, chiefly of iron, and are at once decomposed into oxygen and hydrogen. The oxygen unites with the iron, while the hydrogen seizes on the carbon and rises to an upper level, where the vapors are condensed in part into mineral oil, and the rest remains in a state of natural gas. The petroleum strata are generally met with in the vicinity of mountains, and it may be granted that geological upheavals have dislocated the ground in such a way as to permit of the admission of water to great depths. If the center of the earth contains great masses of metallic carburets, we may, in case this theory is verified,

*Partly estimated.

count upon an almost inexhaustible source of fuel for the day when our coal deposits shall fail us.

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, Jan. 10, 1888.

Gas and its Contemporaries.—The Product Market.—Value of Gas Lime.—"Weldon Mud" as a Substitute for Oxide of Iron.—Warming Houses by Means of Gas and Coke.

At the commencement of another year it is only natural to pause and look around. Altogether the prospect, as we scan the position and circumstances of the gas industry, is satisfactory. A great deal of attention has lately been directed to candles, oil and electricity, and their position as "competitors" with coal gas. I prefer, however, to speak of them as contemporaries. There is the broad fact that the use of gas is increasing, as shown by the published accounts, and it is not usual in trade, when business is found to show a satisfactory increase, to talk much about competitors. The general rule is to look at home to find out the causes that have secured the progress already scored, and to see how they can be fostered in every way in the future. The course of action in this matter, so far as the sale of gas is concerned, is now so well understood and agreed upon, both in this country and in America, that it need not be followed out here. So long as coal and iron continue moderate in prices I see no reason to doubt the possibility of holding the position already attained against all comers. But it is useless to expect that gas will ever become the universal illuminating agent to the exclusion of all others. The oil lamp will always find favor in certain quarters, some will prefer electricity, and candles will never be snuffed entirely out. So there is no benefit to follow from the undue accentuation of the term, "competitors with gas lighting." It only makes people think that we gas folks are a covetous, grasping lot. In England at the present time about one person in every seventeen enjoys the privilege of paying a gas bill every quarter, so there is not very much margin for an increase in the number of consumers, although the experience of the past year gives good grounds for expecting an increase in the "consumption per consumer."

So far as candles, oil and electricity are concerned, we already know the best they can do for themselves, which may be, but not necessarily, the worst they can do for us. Oil cannot possibly get very much cheaper than it is at present, and the cost of producing the electric light is now pretty well known. It may be worth while for a gas undertaking, so circumstanced that it cannot sell gas for less than $1.25 per 1,000 cubic feet, to turn some attention to the electric light; but when, as in our principal towns, it is possible to earn good dividends at prices ranging from 60 to 80 cents, I fail to see that any advantage can follow. As showing what electricity can do, I notice that the municipal authorities in London are now considering a proposal to light an important district by means of electricity. The district in question is at present lighted by 616 gas lamps, the aggregate cost of which would be less than $10,000 per annum. For these it is proposed to substitute 169 arc lamps, at a cost of $130 per annum each; and two other estimates are added, including the use of a larger number of lesser power lights for the narrow streets and alleys, which would respectively increase the cost to the extent of 50 or of 25 per cent. The acceptance of one or other of the schemes included in the addenda may be regarded as imperative, seeing that the district includes many courts, alleys and passages, and the cheaper estimate of the two would amount to $21,200 per annum, or more than double the present cost of gas. It is said that the matter has been under consideration for four years, a fact that speaks well for the wisdom of the authorities, as by this means they have saved the ratepayers a sum of about $45,000 —an amount of some moment even to wealthy London. A penny saved is a penny earned, says the proverb, and therefore they will do well to spread out the considering process for a time longer.

As regards the progress of invention, especial activity has been noticeable amongst makers of regenerative gas burners. These appliances have been improved in respect to simplicity, cost and efficiency, and several makes are now fairly established in the market. Apart from the question of price per thousand cubic feet, the lighting of assembly rooms, halls, shops, etc., can now be carried out much cheaper by means of gas than was possible before the introduction of these improvements, and we are now within measurable distance of a regenerative burner cheap enough to suit all classes. The field of lighting by incandescence has also been very energetically explored, but as yet without much prospect of extended practical success. In the matter of regenerator furnaces, and especially of purification in closed vessels, by means of liquid ammonia solution, some advance is to be chronicled. The plan of revivifying oxide *in situ*, thus avoiding the expense and nuisance of changing the purifiers, is now very generally adopted, and offers every promise of proving a decided success. All these things mean cheap gas.

As regards the market for tar and sulphate, things are slowly improving. Tar has improved to the extent of a few shillings per ton during the year, and sulphate is $6 or $7 better in price than at the end of 1886. Whilst it is useless to expect a permanent return to anything like the prices of 1882, this increase may be accepted as likely to prove a useful help, and as something more than a mere flash in the pan. It is remarkable that the home consumption of sulphate continues so low. The total production during 1887 has been estimated by Messrs. Bradbury & Hirsch at 107,000 tons, of which about four-fifths comes from gas works; but they put the home consumption, including that taken for chemical purposes, at only 23,200 tons. So we may say, roughly, that the shale oil works, iron works, coke ovens, etc., supply enough sulphate for the home consumption, and that the whole production of the gas works is exported. Why cannot the home consumption be increased?

The value of gas lime in agriculture has recently been discussed in the *Journal of Horticulture*, by Mr. G. Abbey. In addition to sulphides of lime and ammonia it contains a compound of sulphur and cyanogen which is singularly destructive of fungoid and insect-pests infesting plants and harboring in the soil. So it is considered under two heads, first as a manure, and, second, as an anti-fungoid and insecticide. As to its use as a manure, the author alludes to the well known corrosive effects on vegetation that occur if it is applied in the fresh state, and goes on to show how these may be avoided and the gas lime rendered unhurtful to plants. When properly prepared the author claims many valuable properties for it. "There is no question whatever of its forming or liberating plant food"—"fertilizing properties of no mean order"—"it is useful in supplying to plants sulphur as well as sulphate of lime, if not ammonia"—"it is much more efficacious than simple lime, and as such is much more advantageously used on light soil"—"it nourishes both directly and indirectly, and prevents the escape of the ammonia from the soil"—"is of enduring benefit," etc. After this come full particulars as to its application as an insecticide, for which purpose the author says it is invaluable and unequalled in efficacy and cheapness. Altogether the article is most useful to those who find a difficulty in getting rid of gas lime, and well worthy of being printed and circulated amongst probable users of the same.

A proposition has been made for the use of a substance obtained in the manufacture of bleaching powder, and known to the trade as "Weldon mud," as a substitute for oxide of iron in the purification of coal gas. This was the substance of a paper* read before the Society of Chemical Industry a few days since by Dr. J. J. Wood and Mr. A. G. Salamon, and the advantages claimed by the authors are that it contains the ingredients necessary for the removal of carbonic acid, sulphuretted hydrogen and carbon bisulphide, and in short that it is in every way superior to oxide of iron. The authors of the paper appear somewhat deficient both in respect to logic, chemical knowledge and practical acquaintance with gas engineering, and their results are based upon laboratory experiments only, so we must await the outcome of trials on a practical scale which are about to be made, before forming any opinion as to whether it is likely to be an improvement on Irish bog ore. The constitution of "Weldon mud" is stated to be 37 per cent. of manganese oxides, 11 per cent. of lime, and the remainder consists of water and impurities. It is scarcely necessary to mention that manganese is a metal very similar in chemical properties to iron, so the behavior of the Weldon mud, both in the purifier and in the revivifying shed would be very similar to that of oxide. Whether it would take up more sulphur at each exposure, or revivify more readily than oxide of iron, as claimed by the gentlemen above named, are at present moot points; but it is difficult to see in what respect it would be a better absorbent of carbon bisulphide. As to carbonic acid its behavior is very plain. The 11 per cent. of lime would take up its equivalent of that substance, say, about 9 per cent. by weight of the whole, and then be converted into inert carbonate of lime, which would remain as such during subsequent revivifications. However carefully scrubbed or washed the crude gas at the inlet to the purifiers contains more carbonic acid than sulphuretted hydrogen, and as the first exposure would take up, it is claimed, some 19 per cent. of sulphur, it is evident that the material would be exhausted so far as the removal of the carbonic acid is concerned, at the first exposure, and rendered perfectly inert for the remainder of its life. So the practical success of the material as a gas purifying agent must stand or fall by its behavior in

Ante, p. 67.

the purifying house and in the revivifying shed, as compared with oxide of iron.

An interesting letter has been written to the *Times*, by Mr. A. E. Fletcher, chief Inspector of Alkali Works, explanatory of a system of warming houses with greater efficiency and economy than ordinary coal fires, and also with avoidance of smoke and its numerous attendant nuisances. The plan followed is to fix a coke stove in the basement, which is made the medium of warming a continuous supply of fresh air from outside. This current of pure and warm air is supplied to every room in the house by means of gratings, etc., and creates a sufficient draught in the existing chimneys to cause them to act as ventilating shafts. Incandescent gas fires are fixed in the grates, but their aid is not often required. By this means equable temperature and freedom from draught is secured, and as it possesses the advantage from a gas manager's point of view of using both gas and coke, the plan is well worthy the attention of gas companies. A few experiments in this direction would not be thrown away.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Mr. Wm. F. Brown, who had been in the service of the Williamsburgh (N. Y.) Gas Light Company for something like 25 years, died at his residence, 103 Conselyea street, Brooklyn, N. Y., on the 10th of last month. He was well known in Brooklyn's Masonic circles.

At the annual meeting of the St. Thomas (Ontario) Gas Company the following officers were re-elected: Jno. Farley, Esq., Barrister, President; M. A. Gilbert, Banker, Secy. and Treas.; Henry Brown, Manager. Directors: Messrs. Thomas L. Lindop, Jas H. Still, D. K. McKenzie, Jno. Baird, Henry Brown, M. A. Gilbert and Jno. Farley.

At the annual meeting of the Washington Court House (Ohio) Gas Light Company Morris Sharp was chosen President, Jerome Penn being selected as Secretary. These gentlemen, together with Judge Daniel McLean, F. L. Nitterhouse and Col. H. B. Maynard, comprise the Board of Directors. The Company expects to make important improvements on the plant next spring, and in all likelihood a new holder will be figured for in the estimates.

Natural Gas Firing at the Toledo (O.) Company's Works.—In the course of a letter recently received by us from Supt. Faben, of the Toledo Gas Light and Coke Company, that gentleman says: "Concerning the use of natural gas for fuel purposes in our works there is but little room for description regarding its application to bench firing. We use an ordinary 'mixer' (as they are termed) on each furnace. The jet opening for gas is ¼ of an inch for benches of 5's, which is increased to ⅜ of an inch for benches of 6's, and the gas is supplied to us under: verage pressure of 1 pound. The device for regulating the supply of gas to each furnace is a 1-inch globe valve, opened about one-third of a turn. I have no means of determining how much is required to properly heat each bench, so I will not attempt a guess. In results, however, it is simply 'great.' No 'regenerator' of my acquaintance can compare with it. It is perfect."

The incandescent electric lighting annex put in at the works of the Hempstead (L. I.) Gas Company last fall is working quite smoothly. About 250 lights are being supplied from the station, and the proprietors are now wiring for 50 more. When these are in circuit the full capacity of the dynamos will be employed. The effect on the sale of gas has been very slight, which means a great deal when it is remembered that the population of Hempstead proper does not exceed 3,300.

The Texarkana Gas Light Company, mention of which was made in our last, is officered as follows: President, W. L. Whitaker; L. Montedonico, Secy.; T. D. Cody, Supt. Construction work is now underway, and it is expected that gas will be supplied from the plant on or before April 15th.

Mr. Geo. H. Gregory has resigned his position with the E. P. Gleason Manufacturing Company, of this city, in order that he may devote his whole attention to the manufacture and introduction of hydrocarbon burners and enriching appliances for gas, especially in connection with natural gas. Mr. Gregory also informs us that 6 of the Arvine patent hydrocarbon burners have been steadily in use for the past 10 months at the 42d street and North River station of the Consolidated Gas Light Company, where they are said to have given every satisfaction, both in the matter of heats secured and economy gained in obtaining them. He also writes that Messrs. Lombard, Ayres & Co. are using the burner with excellent results, they being able by its aid to secure reliable heats from the combustion of crude and waste oils, etc. It is our intention to illustrate and describe this burner in a subsequent issue of the Journal.

Personal—Mr. Thos. F. Rowland.—Having heard many conflicting statements regarding the health of Mr. Rowland, and knowing that authoritative information as to a radical change for the better in his condition would be gladly hailed by the gas fraternity of the country, we are able to say that he is very much improved in health, a stay at Lakewood, N. J., having proved most beneficial. He anticipates spending the remainder of the winter and early spring in some section of the South—quite likely in North Carolina. Indeed, it is only a question of short time when he will once more don the harness of active work.

A Line from Bro. Stratton.—In our issue for January 2 we noted that a change had been made in the method of operating the old Valparaiso (Ind.) Gas Light Company, in that a regular stock company had taken the place of the former corporation, and that an electric plant was in future to be maintained by the new organization. In further explanation of the altered condition of affairs, Mr. Stratton thus writes: "Our contract with the city is for 27 arc lights, at $67.33 each per year, to be in service on an average of 22 nights per month, to burn until midnight. Additions made to the service are to be paid for at the same rate, the agreement to cover a period of 5 years. The number of lamps and price for same being small, I did not think it of enough importance to mention the particulars in my former communication; but, of course, all the brethren are interested in prices, etc., of all operations of this sort. As to the new organization, the President (Mr. Wm. Johnson) is a prominent attorney of our city, and our Treasurer (Mr. D. F. L. Skinner) is President of the First National Bank. I shall retain a controlling interest in the stock, and the active management of the concern. The growth of our city while quiet is steady, and the gas output has increased at the rate of about 20 per cent per annum since I have been in charge of the works. We intend to adopt Lima crude oil for steam fuel, and if it proves to be a success in that respect, we will then use it for heating our benches."

It has transpired that the accounts of both explosions at the works of the Sioux Falls (Dak. Ter.) Gas Light Company were gross exaggerations. The generating apparatus was not at fault in either instance, the trouble being chargeable on each occasion to either faulty handling or defective construction of the purifiers. The loss caused by the Jan. 2 explosion was originally telegraphed on as not less than $10,000, whereas the real damage did not exceed $300. We rejoice with the Sioux Falls gas men over their escape from what might easily have been serious loss.

Mr. Fred. Fabing, Manager of the Fremont (Ohio) Gas, Steam and Power Company, writing under date of Jan. 19, says: "We have put in the American Gas Improvement Company's patent process for making gas from crude oil and natural gas or steam. We have been running it about a week, and are quite well satisfied with the process. The gas is very good and gives general satisfaction so far. We will let you know more about it in the near future." We desire to thank Manager Fabing for his courtesy to us in this matter.

At the annual election of the Easthampton (Mass.) Gas Light Company Mr. E. T. Sawyer was elected President, and H. L. Clark was chosen Clerk and Treasurer. The Directors are Messrs. E. T. Sawyer, Jno. Maher and G. H. Leonard.

Mr. Henry Padan has been re-elected President and Treasurer of the Portsmouth (Ohio) Gas Light Company, and Warren Smith continues as its Secretary,

Cheaper Gas for Bridgeton, N. J.—On the 18th ult. Treasurer Harding, of the Bridgeton Gas Light Company, was authorized to publish the following announcement: "From and after January 1st, and until further notice, the price of gas to general consumers will be $1.50 per 1,000 cubic feet; to consumers using 25,000 cu. ft. per month, $1.40 per 1,000; 50,000 cu. ft. per month, $1.30 per 1,000." This means a reduction all around of 20 cents per M., and shows that Bridgeton's gas men are after the nimble sixpence. Under the circumstances we must concede the reasonableness of the latest Bridgeton schedule, where the total output of gas during the last year did not exceed ten millions cubic feet, and we are therefore prepared to understand the reason which moved the editor of the Bridgeton *Evening Sun* to exclaim: "This will be good news to our citizens;" but we must also confess our inability to comprehend what moved him, in the very next breath, to add, "Bridgeton is furnished with a superb quality of gas, and it is furnished at very reasonable rates." Local editors, as a rule, are not given greatly to this

style of expression when apostrophizing local gas and gas men; but the unexpected once and awhile will happen. At any rate, Brother Harding and his associates have put themselves in a fair way towards being obliged next summer to make extensive additions to their carbonizing and purifying plant.

NEW COMPANY AT JEFFERSON CITY, MO.—The Jefferson City Light, Heat and Power Company, capitalized in $100,000, has succeeded to the franchises formerly enjoyed by the Jefferson City Gas Light Company and the Wagner-Fisher Electric Light and Power Companies. Mr. W. Wagner is the presiding officer of the new Company, and Mr. C. E. Hess is to act as its Secretary and Treasurer.

NATURAL gas prospectors are sinking drills in the vicinity of Denison, Texas. So far they have not met with success, and are not likely to. The business prospects of the Denison Gas and Coal Company were never brighter, and Secretary Cullinane is kept quite busy. This plant will be enlarged next spring.

SOME two or three years ago the authorities at Houston (Texas) entered into a contract for the public lighting of the city with the proprietors of what was then known as the Houston Electric Light Company, of which concern Mr. E. Raphael was President. About ten months ago the plant of this Com any was purchased by other parties, and the new Company agreed to carry out all the contracts of its predecessor—Mr. Raphael acting also as President of the new concern. The lighting of the city was faithfully carried out, and the Company's bills for same for the months of May, June, July, August, September and October were allowed by Mayor Smith and duly paid. When the November statement was presented for audit the Mayor, who suddenly developed a penchant for rigid construction of contracts, refused to certify to it on the ground that the present Company was not the one with which the city had contracted, and asserted that the contract lapsed when the property of the original Company had been disposed of to its successors. Why the Mayor did not reach this conclusion some months ago is possibly a matter which certain local capitalists with whom he is identified might easily explain; for rumor hath it that they are anxious to either sell to the city an electric lighting plant, or to organize a Company on their own account, that shall be guaranteed from its birth a large share of municipal favor. Whether so or not, the lighting accounts for November and December were neither audited nor paid, and the contractors, failing to see why they should continue a service for which no money was forthcoming, early in January cut off the current, and Houston now revels or wallows in darkness. It might be added that Major T. F. White, of the Houston Gas Company, is Secretary of the Company which succeeded to the estate of the old Houston Electric Light Company.

ANNUAL ELECTION, HOUSTON, TEXAS.—Speaking of Major White brings to mind the fact that the annual meeting of the Houston Gas Light Company was held on Jannary 14. The reports read prove the stability of this sterling gas undertaking, and show the wisdom of those who introduced gas illumination to the residents of this section of the Lone Star State. The election for Directors resulted in the selection of Messrs. J. T. Brady, T. W. House, T. H. Scanlon, H. S. Fox, and Chas. Dillingham. The Directors subsequently ratified the following permanent organization: President, T. W. House; Vice-President, T. H. Scanlon; Sec., Treas. and Supt., Major T. F. White. When the business details had been satisfactorily disposed of the Directors, at the invitation of Major White, repaired to the latter's residence, where all were soon speedily engaged in absorbing a dinner that spoke volumes for the Major's skill in mastering the delicate details of arranging a *menu*. It is needless to descant upon his ability as an entertainer.

AFTER May 1st Brother Cosgrove promises that the people of Evanston (Ills.) shall receive their supply of gas at the net rate of $1.50 per thousand cubic feet.

WE understand that articles incorporating the Creston (Iowa) Water and Light Company have been filed with the Secretary of State. The Company is capitalized in $250,000.

THE Directors of the dark and forbidding castle known as San Quentin (California's State Prison) have finally decided how the buildings shall be lighted for the coming year. They originally contemplated the purchase of an electric plant, but investigation having disclosed the fact that this would be a decidedly extravagant course to pursue, they finally authorized the San Rafael Gas Light Company, whose plant is about 3½ miles from the prison walls, to supply them with 10 Brush arcs, of 2,000-candle power each, the lights to be located at appropriate points in the prison yards. The price agreed upon was $180 per light per year. As formerly, the interior illumination is to be performed by gas.

THE Citizens Gas Light Company, of Jackson, Tenn., was organized in 1872, and, owing to the acumen of those who purchased the original site, is now the owner of about 2½ acres of extremely valuable real estate. The initial plant represented an outlay of about $42,000, which sum was subsequently increased considerably, owing to an unfortunate experiment made with wooden mains. While the organizers of the Company were pretty good land purchasers, they evidently were not equally well posted in regard to plant construction; for in a few years' time the wooden conduits employed were about as well adapted to conveying gas as a line of sieves would have been. Two years ago the works were, to all intents and purposes, rebuilt; the cost of the undertaking amounting to $15,000. It was supposed these improvements would suffice for a number of years, but '87 beheld the work of extension again in progress. An addition was made to the retort house, wherein a new bench of 6's was placed, the annex placing the Company in position to supply any possible demand that might be made upon it. A new coal shed was added, the purifying system was enlarged and improved, and many minor details were attended to. The bench work was completed last month, and is giving every satisfaction. Last September the Company entered into a contract with the city to light the streets by electricity, agreeing to have the lights in operation by Jan. 1. The work of installation, however, proceeded so smoothly that the lights were turned on a week before Christmas, and appear to give satisfaction to the powers that be. The system adopted was the "American." The plant is a 50-light one, but it is proposed to increase the capacity to 100 lights in the near future—the power equipment was originally adjusted with this contingency in view. The latest improvement (including moneys expended on the gas and electric divisions of the service) represent an investment of $30,000, or a total of about $75,000 as the figure which guarantees to Jackson's residents a thoroughly reliable gas and electric supply. Maj. Putnam deserves the support of the people, and he is pretty certain to receive it.

PADUCAH (Ky.) is congratulating itself over the excellent service now being rendered the citizens by the rejuvenated Paducah Gas Light Company. The works are quite complete in every respect (maximum capacity, 100,000 cu. ft. per diem), and are managed with rare executive ability by Superintendent Henry W. Meyers, formerly of Louisville, Ky. Paducah boasts of 300 public lamps, although that number is somewhat of a tax on the gas suppliers, since many hundred feet of otherwise unproductive mains (the Company's mains pass through 16 miles of ground) had to be buried in order to keep some of the lamps in duty. The officers of the Paducah Company are: President, John Gilbert, of Evansville, Ind.; Secretary, Saunders A. Fowler, a Paducah homebred; Supt. and Manager, H. W. Myers.

ANNUAL ELECTION, WILLIAMSPORT, PA.—At the annual meeting of the Williamsport Gas Company, the following officials were elected: President, Hon. Jos. M. Gazzam; Sec., Treas. and Supt., C. A. Byers; Collector, Jas. Calvert; Solicitor, John G. Reading, Jr. Directors, R. P. Allen, R. J. C. Walker, John G. Reading, J. M. Gazzam, John G. Reading, Jr., B. C. Bowman, and H. Mudge.

THE people of Peru, Ind., entertain a widely different opinion now to that held by them a couple of years ago regarding the local gas works. Of course the reversal is not to be wondered at, for since the control of the plant has passed into the hands of the American Gas Company everything has been done to meet the wishes and wants of the people. The works have been completely remodeled and placed in first-class condition, and Supt. Tracy deserves credit for the way in which he has conciliated the people, while not abating in so doing an inch from the just rights of his employers.

MR. W. H. HAYDEN is now in charge as Superintendent of the works of the Meridian (Miss.) Gas Light Company.

THE QUALITY OF ST. LOUIS (MO.) GAS.—Gas Inspector Thos. J. Caldwell, reporting to the Mayor on the quality of gas supplied in St. Louis for the week ending Jan. 6, found the lighting value of the Laclede Company's gas (average) to have been 17.94 candles; that supplied by the St. Louis Company, 18.16 candles—both being well above the statutory requirements.

ANNUAL MEETING, SPRINGFIELD, MASS.—At the annual meeting of the Springfield Gas Light Company the following officers were chosen:

Treasurer, J. L. Hallet; Clerk, John B. Allen; Directors, M. Chapin, E. Gunn, J. A. Rumrill, H. S. Lee, S. D. Porter, W. H. Haile, Luke Corcoran, M. D., W. H. Wesson, and J. L. Hallett. The Directors, as the result of an inspection of the structure, have formally accepted the new gasholder on Water street. It works perfectly. The Company during the year increased its main (gas and steam) system by about 20,000 feet.

WINFIELD (KAS.) HAPPENINGS.—Some months ago it looked as if the Winfield Gas Light Company was about to be confronted by opposition in the shape of an electric lighting company, steps having been taken for the organization of such a corporation. President Fuller thought the best way out of the dilemma was to add an electric annex to the Gas Company's plant, whereupon negotiations were opened with the Thomson-Houston folks, with the result that an arc plant of that type is now being put up. We understand that an incandescent plant will be installed later on. This action caused the collapse of the independent electric movement, and President Fuller smiles benignly over his bloodless victory. We, however, confess to surprise at information which goes to show that the Winfield Company has accepted the resignation of its former Superintendent—wideawake and energetic Geo. B. Burns—whose best efforts have always been put forth on behalf of his employers. During his administration the Company's roll of consumers has been largely augmented, and the city lighting has followed suit, and we have every reason to believe the Company was entirely satisfied with him.

A LINE FROM IRONTON, OHIO.—Mr. W. W. Prichard, Sec. and Treas. of the Ironton Gas Company, writes: "We have had a very prosperous year, the reduction in prices instituted in 1886 seeming to work in our favor, as was confidently expected. I was quite ill during the height of the past season for selling gas stoves, and therefore did not dispose of as many as I would otherwise have. In reality, though, they are selling themselves. An argument in favor of the position taken by me in the paper read before the Dayton meeting (1887) of the Ohio Association is afforded by the increased consumption of those entitled to the gas stove rate. In 1886 the same consumers burned 365,500 cubic feet, who, in 1887, used 786,400 cubic feet—the figures to be modified only to the extent of 47,900 cubic feet to be charged to new consumers in 1887." A pretty sound kind of an argument, that.

BIDS FOR ELECTRIC LIGHT.—The Lamp Committee, Lancaster, Pa., advertise their willingness to receive sealed proposals for the lighting of two square miles of the city with electric lights. The successful bidder will have to furnish a complete plant, including power, dynamos, poles, wires, lamps, etc. Bids, which will be received until 6 P.M., of Friday, Feb. 17, must be forwarded to "Wm. Riddle, Chairman Lamp Committee, Mayor's office," and be indorsed, "Proposals for Lighting City." Bids for lighting by gas and oil respectively are also asked for.

HELENA (MONTANA) GAS NEWS.—At the Annual meeting of the Helena Gas Company the following gentlemen were selected to preside over the fortunes of that corporation during the current year: President, C. W. Cannon; Vice-President, T. H. Kleinschmidt; Sec. and Treas., L. A. Walker. Directors, the above named and Messrs. C. A. Broadwater, M. Morris, and H. M. Parcheu. Mr. C. M. Williams was reappointed Superintendent. The Directors, after discussing the matter thoroughly, decided on carrying out an extensive system of plant improvement in the spring, the cost whereof is estimated to absorb upwards of $30,000. They concluded their session in a decidedly practical way by ordering that the gross gas rate be reduced 50 cents per thousand cu. ft., the reduction to take effect from 1st inst. The general schedule now in force is appended:

Value of Monthly Bills.	Net rate per M.
Less than $50	$3.00
$50, but less than $100	2.85
$100, " " 150	2.70
$150, " " 200	2.55
$200 and upwards	2.40

The discounts do not take effect unless bills are settled within ten days. When it is borne in mind that Crested Butte coal (the grade used) costs over $14 per ton, it will be seen that the Helena Company's new schedule is a decidedly equitable one. However, the coke market is a pretty good one out that way. Keep it up, Mr. Williams.

IN the suit for permanent injunction brought by the Albo Carbon Light Company against the Crystal Carbon Light Company, in the U. S Circuit Court for the Eastern District of Pennsylvania, the trial Judges (McKennan and Butler) have declared against the plaintiff. This decision is in direct conflict with that rendered some time ago in a similar suit tried before Judge Gresham, of Chicago, Ills. The Albo Carbon Light Company will carry the Philadelphia case to the notice of the Supreme Court of Pennsylvania.

FIGURES THAT SPEAK FOR THEMSELVES.—The following figures speak very eloquently as to the bonanza enjoyed by Fire Chief Nevins and his merry men in connection with their "wise investments" in the shares of local electric lighting companies. From the figures now on the books of the City Works Department the total sum available for street lighting purposes in the current year is $483,132. Last year $177,138 was paid for electric lights, and $220,902 was paid for gas lights, or a total of $398,040. The number of arcs maintained was 1,007; gas lamps, 10,265. It will thus be seen that $85,092 more will be expended this year on street lighting than in 1886; and we are quite within bounds when we predict that three-fourths of the additional appropriation will be absorbed by the companies whose real telephone and mail address should be, "Headquarters, Fire Department, Jay street."

COLLECTOR FARGO'S BAD LUCK.—At the annual meeting of the Citizens Gas Light Company, Warsaw, N. Y., Messrs. T. G. Hulett, S. Pettebone, A. Frank, L. W. Thayer, W. Bristol, L. E. Walker, S. D. Lewis, W. J. Humphrey and J. B. Gates were chosen Directors. No change was made in the executive management. Treasurer B. F. Fargo, who also acts as collector for the Company, did not feel as chipper as usual, although he can hardly be reproached for feeling a trifle downcast. He, seeming to abound in faith in his fellow citizens, guaranted the payment of the gas accounts during 1887, but when the returns were all in it was found that his confidence had cost him over one-half of his yearly salary. Put not your trust in the average gas consumer, for he is apt to fool thee.

MORE JETER-BOARDMAN ENTERPRISES.—Perhaps it is unkind, if not inhuman, to feel pleased over the temporary ills of a brother; but the nearness of our approach to inhumanity on this occasion is traceable to a gossipy letter just received from the second man in the Jeter-Boardman Gas and Water Association, in which Sec. Boardman explains that he is now convalescent from a severe cold that confined him to his house for a few days, the immurement affording him an opportunity to "drop us a line" that otherwise might not have been "dropped." Mr. B. says: "Organized Jan. 13 the Tampa (Fla.) Water Works Company; capital, $100,000. Directors, J. S. Schofield, J. H. Campbell, and A. E. Boardman, of Macon, Ga., W. A. Jeter, of Brunswick, Ga., and Col. Sparkman, of Tampa, Fla. Officers, J. S. Schofield, President; W. J. Allen, Secy.; A. E. Boardman, Treas. Work already begun and being rapidly pushed. No fear of yellow fever after these works are built. Good water and good sewers to follow. Organized Jan. 14, the Ocala (Fla.) Water Company; capital, $50,000. Directors, J. H. Campbell, A. D. Schofield, A. E. Boardman, W. A. Jeter and R. L. Anderson. Officers, J. H. Campbell, President; R. L. Anderson, Secretary; A. E. Boardman, Treas. Tower and buildings nearly finished; boilers and machinery being erected; pipe, etc., on the way. So much for the news in my bailiwick." Isn't the bailiwick extending, Bro. Boardman?

THE Phœnixville (Pa.) Gas works were sold at auction on Dec. 31st. Messrs. G. S. and H. Griffin were the purchasers. Price, $8,000.

THE Chicago (Ills.) Heat, Light and Power Company has been incorporated with a capital of $5,000,000. Incorporators, J. P. Gardner, R. S. McFadden and H. A. Gardner.

THE Committee on lighting the Chattanooga (Tenn.) court house buildings received two bids. The Hauss Electric Light Company agreed to perform the work for $420 per annum; the Chattanooga Gas Light Company bid $320, in case the quantity used (212,800 cu. ft.) last year was not exceeded—all above that amount is to be charged for at the rate of $1.50 per thousand. It was decided to accept the bid of the gas men.

THE Springfield (Mass.) Gas Company gained 229 consumers in '87.

THE Hudson (N. Y.) Gas Company has instituted a $2 rate—a reduction of 50 cents per thousand from the old schedule.

ANNUAL ELECTION, PORTSMOUTH, OHIO.—At the annual meeting of the Portsmouth Gas Light Company, Messrs. E. Miller, M. B. Tewksbury, W. M. Pursell, F. B. Kehoe and H. Padan were elected Directors. Mr. Padan was subsequently chosen President and Treasurer, Warren Smith being named as Secretary. The Directors then paid attention to the gas rates, the discussion resulting in a determination to fix the price

at $1.75 per thousand, the reduction to date from Jan. 1. The prior charge was $2. President Padan's voice is again heard throughout the land.

THE Hamilton (O.) Gas Light and Coke Company recently submitted a proposition to the City Council whereby it agreed, in consideration of certain privileges, to bind itself to supply gas to the city and the citizens at the net rate of $1.10 per thousand for the next ten years. That is not very far from the dollar mark.

THE Lancaster (Pa.) Gas Light and Fuel Company has contracted with Messrs. Deily & Fowler for the erection of a gasholder, to have a capacity of 200,000 cu. ft.

ANNUAL MEETING, WORCESTER, MASS.—From the reports presented at the annual meeting of the Worcester Gas Company, we learn that the total manufacture during the year was 93 million cubic feet, 12 per cent. of which consisted of water gas. The new holder is up to every requirement. 226 new consumers were gained. About 3 miles of street mains were put down. 21 new street lamps were located, the total number of same being now 617. The meter records show that of those instruments tested 94 were correct, 170 were fast, 211 were slow, while 8 failed to register. The officers elected were: Dr. Joseph Sargent, President; J. P. Hamilton, Clerk and Treasurer; Directors, Dr. Sargent and Messrs. C. Foster, A. G. Bullock, J. E. Davis, S. Woodward, W. Lincoln and J. H. Clarke. We regret to say that no better change for the better is reported in the physical condition of Supt. Rollins, who, however, bears his suffering with the fortitude of real manhood. Hereafter the annual meeting of the Company is to be held on the Wednesday following Sept. 10.

ANNUAL MEETING, CHARLESTOWN, MASS.—The stockholders of the Charlestown Gas Company have selected the following executive managers: Directors, Messrs. J. F. Hunnewell, W. W. Wheildon, P. J. Stone, J. A. Sawtell, L. B. Hathon, C. F. Byam, and C. R. Lawrence. Mr. Hunnewell was re-elected President, Mr. Geo. B. Neal, of course, being again named Clerk and Treasurer.

HEREAFTER the Illion (N. Y.) Gas Light Company will sell gas at $2.50 per M. Hitherto $3.50 was the price paid. Considerable of a drop, surely.

AT the annual meeting of the Syracuse (N. Y.) Gas Light Company Brother Austin C. Wood was chosen to fill the vacancy in the Directorate caused by the death of Gen. E. W. Leavenworth. A wise selection, and one well deserved by the recipient thereof. No other change was made in the executive management.

PRESIDENT Col. S. Shock, Sec. and Treas. J. Jansen, and Managers H. M. North, H. F. Bruner, M. S. Shuman, C. E. Greybill and J. H. Black will control the affairs of the Columbia (Pa.) Gas Company during the current year.

THE Centralia (Ills.) Gas Company has elected the following Directors: S. Andrews, G. L. Pittenger, J. Kohl, E. S. Condit, S. M. Warner, F. Kohl and F. M. Tomkins.

THE Palmyra (N. Y.) Gas Light Company's Board of Directors comprises Messrs. P. T. Sexton, C. Seely, A. P. Crandall, A. W. Lansbury and C. McLouth.

ANNUAL MEETING, MALDEN, MASS.—At the annual meeting of the Malden and Melrose Gas Light Company the following officers were chosen: President, Joshua F. Foster; Treas. and Supt., Geo. D. Bill; Directors, J. T. Foster, Geo. D. Bill, A. M. Copp, D. Russell, D. P. Cox, L. True, L. S. Converse, D. W. Gouch and J. H. Converse. After a semi-annual dividend of 3 per cent. had been declared, the directors considered the advisability of reducing gas rates. Brother Bill's arguments were of such a nature that the Board authorized him to fix the gross price at $2.20 per M., the same to be modified by a rebate of 20 cents when bills are paid within 20 days. This is equal to a reduction of 20 cents per M. The conduit system of this Company was greatly improved during '87.

THE Dundas (Ontario) Company's purifying house was badly injured by an explosion therein on the night of Jan. 23. Manager Thomas had a narrow escape. The supply to the town was not interfered with.

THE Lynn (Mass.) Gas and Electric Light Companies have been consolidated.

AT the annual meeting of the Columbus (Ga.) Gas Light Company J. B. Holst was chosen a director in place of the late Amory Dexter, and T. D. Huff was elected Secy. and Treas. The other officials were re-elected. A semi-annual dividend of 3 per cent. was declared.

AT the meeting of the stockholders in the Louisville (Ky.) Gas Company to elect their representatives (four members of the Board are chosen by the city) on the Directorate, the gentlemen chosen were Messrs. Geo. W. Morris, T. L. Barret, A. H. Barret, J. M. Atherton and J. L. Smyser.

THE San Francisco (Cal.) Gas Light Company was organized in 1852 by Messrs. Jas. and Peter Donahue. When gas was first distributed there, consumers paid for it at the rate of $15 per thousand. Now the price is $2.

ON account of the bursting of a city hydrant, located in North Bridge street, Poughkeepsie, N. Y., the Poughkeepsie Gas Light Company's plant was damaged to the extent of $1,000. The break occurred at an early hour on the morning of Jan. 26. Is the city responsible for the damage, Bro. Tracy?

Correspondence

[The JOURNAL is not responsible for the opinions expressed by correspondents.]

The Explosion at the New Albany (Ind.) Gas Works.

GAS LIGHT AND COKE CO. OF NEW ALBANY,
NEW ALBANY, IND., Jan. 18, 1888.

To the Editor AMERICAN GAS LIGHT JOURNAL:

I notice that in your issue of Jan, 16 mention is made by "Retort" of the explosion which occurred in our purifying house on Jan. 9. At 3:30 P.M. of that day our city was startled by the shaking of houses and the rattling of windows and doors. At first it was thought that an earthquake shock had been experienced, but, unfortunately for us, the cause of the trembling existed in our purifying room. The effect of the explosion was such that our purifying room (60 by 30 ft.) was completely wrecked. The walls of the building were thrown down and outward with great violence, destroying in their descent a tannery shed, and partially caving in the wall of an adjoining stove foundry. The work of clearing away the wreck was immediately commenced.

Our purifying boxes rest upon foundations built up solidly from the ground, and have no dependence on the building proper for support; hence they were not seriously damaged. The chief damage to them consisted of some ugly-looking holes punched in the covers by reason of falling rafters. Some of the pipe that ran along close to the roof of the building, and which was supported by the rafters, of course came down. Strange to say, however, it did not break, and all that was done to it was to raise it, caulk the joints, etc.

The holes in top of purifiers were speedily closed by plugging them up with pieces of wood, over and around which cement was plastered. By 8 P.M. some 50 laborers had cleared away the greater part of the rubbish and gas was again made. The accident did not in any way interfere with or prevent us from furnishing gas to the city. A temporary frame structure has since been constructed over the purifying room.

I cannot in any way account for the explosion. Nothing was found to have been ruptured or broken, and no pipes were choked. In fact, with the exception of the holes that had been punched in the covers by the falling timbers and the leaks developed in the line of pipes attached to the rafters, which defects were caused by the explosion itself, everything connected with the apparatus was as it should be. One of our firemen had been in the room about five minutes before the explosion occurred, and reports that everything was then all right. A boy was fitting steam pipe in the building when the accident occurred; but, other than injuries occasioned by a slight scorching, he was not seriously hurt. Upon resuming his duties a few days afterward, he said that no light was burning in the building at the time of the accident.

I cannot account for the accident in any conceivable way.

Very truly, JAS. W. DUNBAR, Supt.

What Should a Fair Leakage Figure be?

BOSTON, MASS., Jan. 20. 1888.

To the Editor AMERICAN GAS LIGHT JOURNAL:

Some time ago I asked in your columns for information as to what was considered a *tolerable* leakage per mile of main. I have never seen any reply to my questions. As a matter of curiosity I have taken from the Report of the Gas Commission of Massachusetts the amount of leakage given under oath to them by the officers of 50 companies supplying gas in that State, and I find the *average* for the year 1886 was 183,584 cubic feet per mile of main. The Boston Company is not included in my list; the others are taken in alphabetical order from the report. The above average for the year is, nearly enough, 500 cubic feet per mile of main per day, winter and summer, throughout the year.

Can any of your readers give any figures with which these may be compared?

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

Editor—JOS. R. THOMAS, C.E.
Asst. Editor—T. J. CUNNINGHAM
Manager—C. E. SANDERSON.

PUBLISHED ON THE 2ND AND 16TH OF EACH MONTH
At No. 42 Pine Street, New York.

THUSRDAY, FEBRUARY 2, 1888.

The Market for Gas Securities.

The market for city gas shares remains inactive, but values are firmly held. We note a recent sale at auction of 800 shares Consolidated, at 76⅝. Also, $2,000 old Metropolitan bonds (6 per cent. due 1901), at 115½. Other city shares show no change. Brooklyn stocks are weak, although the decline in them is very slight. The Directors of the Metropolitan Company have canceled the stock (amounting to $130,000) in the treasury, thus bringing the authorized capital down to $870,000. When they stiffen up their spinal columns to a point that will cause them to manufacture gas on their own account, instead of, as now, acting in the capacity of middlemen for the Fulton-Municipal Company, they will be able to earn and pay a fair dividend. The Boston *News Bulletin* says that negotiations between the Boston and Bay State Gas Companies "are entirely off." We do not see how it could well be otherwise. Bonds on your own plant constitute queer purchase money, particularly when the seller can have lithographing or engraving performed as cheaply as could be done by the purchasers. We note sales of 3 shares Charlestown (Mass.), dividend on, at 93; 16 Cambridge, at 179; and 10 Jamaica Plain, at 160½. The Savannah (Ga.) Gas Company has divided 2½ per cent.; the Louisville (Ky.) Company, 3 per cent.

WANTED,
POSITION AS SUPERINTENDENT of GAS WORKS
Must be a works sending out 10 million or more. The very best of references as to character and ability as a Gas Engineer. Is at present engaged as Supt. of a works. South or Southwest preferred. Salary an object. Address
687-1 "MANAGER," care this Journal.

Position Desired,
As Superintendent or Engineer of a Gas Works,
By a competent man of many years' experience. Thoroughly understands the manufacture and distribution of coal and water gas. Perfectly familiar with the construction of gas works in every detail. Satisfactory references furnished. Address
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As Superintendent of a Small Works or Assistant in a Large Works,
By a gas engineer with best of references. Address
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By the present Manager of a small gas works,
A Position to go to Central or South America to Build or Manage Gas Works.
Ten years Manager in present position. Address
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Position as Superintendent of a Gas Works,
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WANTED.
One 8-inch Condenser.
One 8-inch Rotary Exhauster.
Write particulars and price to
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WANTED—SECOND HAND.
Complete Set of Purifiers,
6 ft., with Dry Center Seal, 6 in. connections, complete. Also,
One Set Bench Castings
for a bench of 5's.
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GASHOLDER PAINT,
Ready for Use.
For painting Holders and other Iron and Wood Work about Gas Works.
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Ready for Use. For patching and coating iron and clay retorts, pipes, connections, etc. In use and approved by the principal Gas Companies in the United States.
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FOR GAS RETORTS.
(Patented Nov. 28, 1882.)
Simple! Effective!
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Price, $5.00.
This is a valuable and important work, a copy of which should be in the possession of every gas company in the country, whether large or small. As a book of reference it will be found invaluable. It is the only work of the kind which has ever been published in this country, and is most complete. Handsomely bound. Orders may be sent to
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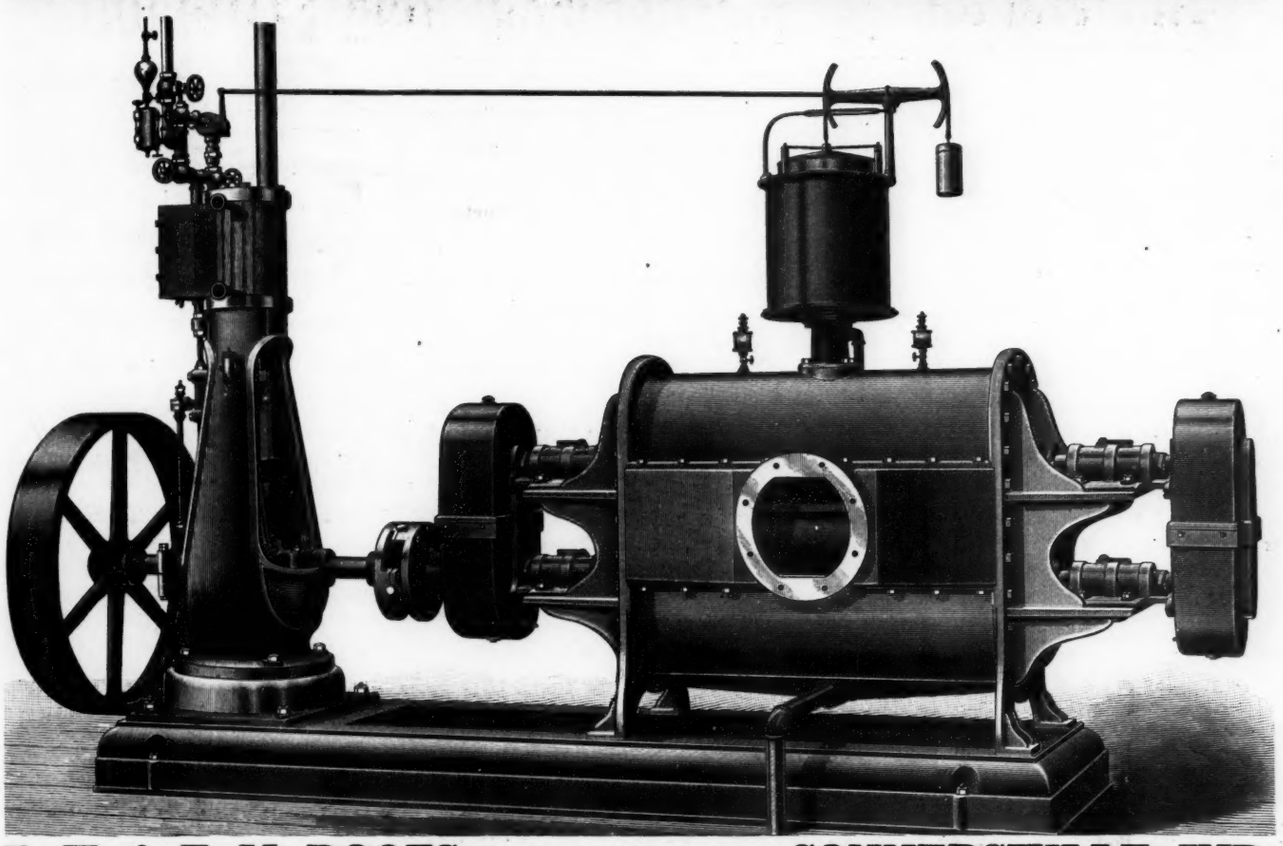
Plans and Estimates Furnished.

ROOTS' NEW GAS EXHAUSTER.



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THIS SYSTEM HAS SHOWN ITSELF IN THOUSANDS OF CASES—**IN HALLS, CHURCHES, PICTURE GALLERIES, CONCERT HALLS, RESTAURANTS, BANKS, CLUBS, STORES, OFFICES,** and **PRIVATE RESIDENCES**—TO BE THE

Best Adapted and Most Successful Method of Gas Lighting Ever Offered.

The SOFTNESS AND PURITY OF THE LIGHT make it most desirable for Office and Household Uses. Its BRILLIANCY and POWER render it unrivaled for lighting Halls, Churches, etc. Its ECONOMY secures for it general favor wherever used.

NOTICE.—Suits are pending in the United States Circuit Court for the Northern District of Illinois and in the Supreme Court of the United States against various parties for infringement of our Letters Patent No. 247,925, dated October 4, 1881, and No. 333,862, dated January 5, 1886. All persons are cautioned against manufacturing, selling, or using any apparatus or material which infringes our patents. We intend to prosecute all parties infringing patents owned by us.

ALBO-CARBON LIGHT CO. (Sole Manufacturers for the United States) **Main Office, Newark, N. J.**

To All Whom It May Concern!

The SIEMENS-LUNGREN COMPANY hereby warns the public against the use of various infringing Regenerative Gas Lamps which are offered for sale. This Company has heretofore delayed bringing suit to enjoin the manufacture or importation of such infringing lamps, solely because of the practical worthlessness of the infringing devices; and although, in each instance, they infringe some one or more of the various patents owned or controlled by this Company, they have fallen into disuse sooner than any suit could be brought to a hearing. As, however, the introduction of these infringing lamps has tended to discredit the practicability of our Company's system of regenerative gas lighting, we have instructed our Attorneys, Messrs. Geo. Harding, C. S. Whitman, and Silas W. Pettit, to give notice that legal proceedings will in future be taken against all such infringers.

THE SIEMENS-LUNGREN CO., 21st St. & Washington Av., Phila., Pa.

The Walker Tar and Carbonic Acid Extractor.

A very general demand exists, in both large and small Gas Works, for an apparatus that will be absolutely efficient in the removal of the tar which passes the hydraulic main and condenser. Many attempts have been made to accomplish this, but, I believe, without success, until the introduction, five years ago, in England, of the C. & W. Walker Patent Tar and Carbonic Acid Extractor. During these years this apparatus has been adopted by many of the most prominent Engineers, not only in England, but also on the Continent of Europe and in other parts of the world. It is only necessary to give here a partial list in order to convince any intelligent American Gas Engineer that this machine must have succeeded fully in accomplishing the desired results.

The following Engineers have personally given permission to refer to them:

G. C. Trewby, Esq., Engineer-in-Chief of the Gas Light and Coke Co., London. The manufacturing plant at Beckton is built in complete sections of 3,000,000 cubic feet capacity each. A Walker Tar Extractor has been fi ted to each one of these sections. This was done after a long and thorough trial on one of its sections. The Tar Extractar has been supplied to other works of the Gas Light and Coke Co., including those of which John Methven, Engineer of the Gas Light and Coke Co. at the Nine Elms Station, is in charge. Also to G. E. Stevenson, Peterborough Gas Works; B. Green, Mitcham and Wimbledom Gas Works; W. H. Smith, Bedford Gas Works; F. Linging, Norwich Gas Works; J. T. Browning, Colchester Gas Works; S. B. Darwin, Portsmouth Gas Works; J. McCrae, Dundee Gas Works; W. J. Wells, Stamford Gas Works; J. M. Darwin, Longton Gas Works; J. Paterson, Warrington Gas Works; and J. Coulter, Esq., of the Dundalk Gas Works.

Also to the Engineers of the Imperial Gas Associati n at Antwerp, Amsterdam, Brussels, Frankfort-on-the-Main, and Aix-la-Chapelle Gas Works; to Dr. T. H. Van Doesburch, of the Rotterdam Gas Works; A. F. Spruyt, Esq., of the Utrecht Gas Works; M. Mallema, Esq., of the Zwolle Gas Works; G. Deronde, Esq., of the Leeuwarden Gas Works; the Engineer of the Kampen Gas Works, Holland; C. Ponchain, Esq., of the Gas Works at Rome, Italy; and to A. Normanton, Esq., of the Campinas Gas Works, Brazil.

Mr. Charles A. Gerdenier, Superintendent of the Bridgeport (Conn.) Gas Light Company, writes as follows, under date of Dec. 3, 1887:

"The C. & W. Walker Tar and Carbonic Acid Extractor has been in operation at these works for the past six weeks, and is an unqualified success. It removes every particle of Tar from the gas in once passing through the apparatus and a large percentage of the Carbonic Acid. I also feel quite sure that it prevents the formation and deposit of Naphthaline, because since I started the Washer I have had no stoppages from this cause. These works have been seriously troubled with Tar for many years, and I have used several kinds of apparatus and every expedient which has come to my attention for dealing with the difficulty, but without success. The Walker apparatus occupies comparatively small space, is less expensive than other systems, and requires but little attention. I carry 2½-inch seal, and have an automatic tar delivery valve. This Tar Extractor is indispensable to gas makers."

Mr. Thomas Littlehales, of the Hamilton (Ontario) Gas Light Company, writes as follows, under date of Dec. 28, 1887:

"Last summer we erected at these works a C. & W. Tar and Carbonic Acid Extractor, which is doing really excellent service. It works admirably, diminishing the duty of the purifiers and allowing them to run longer, purifying more gas per bushel of lime."

I have taken the Agency for the United States for this apparatus, and am now prepared to make contracts to erect it on the premises of any Gas Company. It can be manufactured in the following sizes:

No. 1	50,000 to	100,000	cubic feet	per	Twenty-four	hours,	3	feet	square,	5 feet deep.
No. 2		125,000	"	"	"	"	4	"	"	" "
No. 3		250,000	"	"	"	"	5	"	"	" "
No. 4		500,000	"	"	"	"	6	"	"	" "
No. 5		750,000	"	"	"	"	7	"	"	" "
No. 6		1,000,000	"	"	"	"	8	"	"	" "
No. 7		1,250,000	"	"	"	"	9	"	"	" "
No. 8		1,500,000	"	"	"	"	10	"	"	" "
No. 9		2,000,000	"	"	"	"	12	"	"	" "
No. 10		3,000,000	"	"	"	"	15	"	"	" "

This Tar Extractor will perform its work with about one-fourth the usual back-pressure heretofore required. It is simple in construction, and can be supplied at a very reasonable price—less than any other ever before introduced. Satisfactory results will be guaranteed in every instance.

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SOLE REPRESENTATIVE FOR THE UNITED STATES,

No. 69 Wall Street New York.

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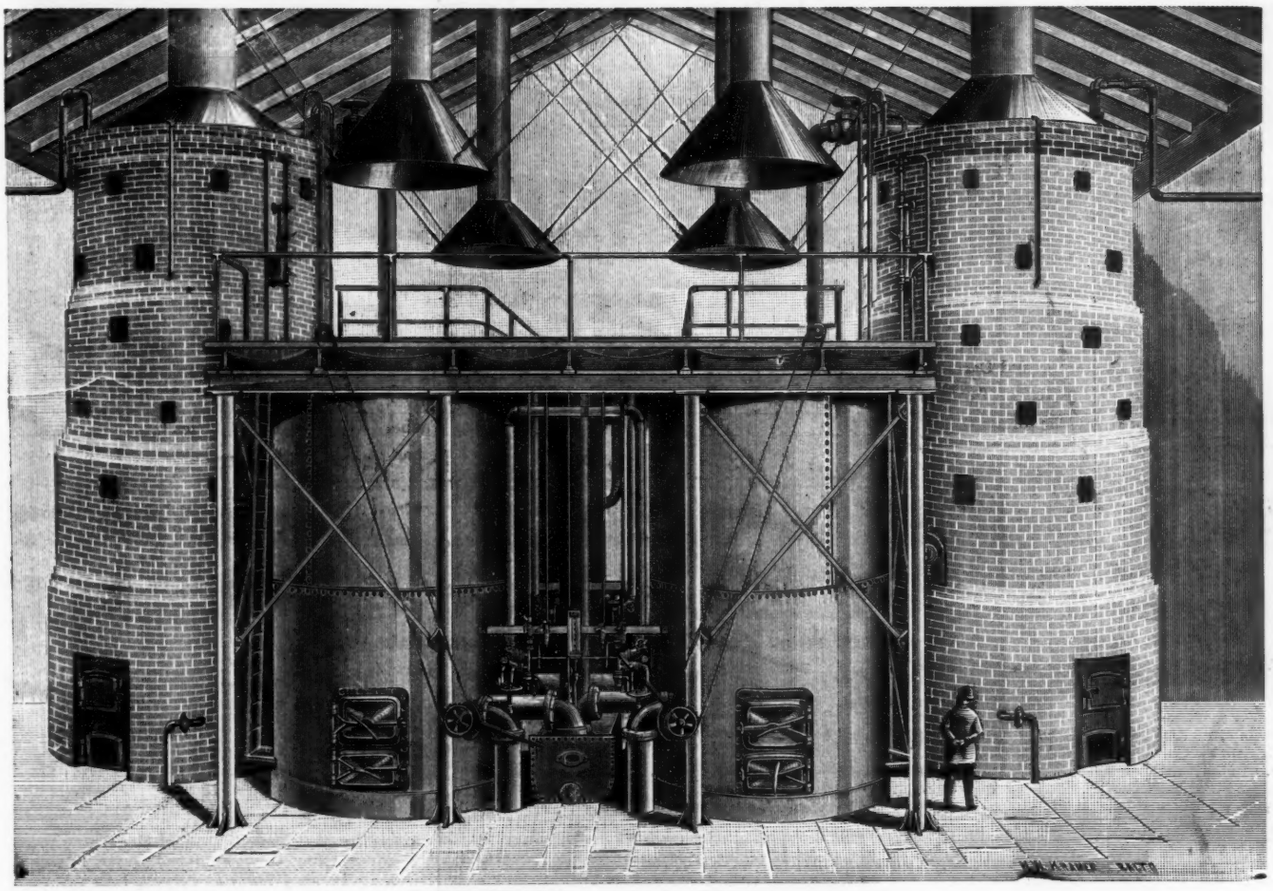
Munich Regenerative Furnace, System Drs. Schilling & Bunte.

Greatest durability; minimum of attention; complete distillation in 3½ hours; 10 to 13 pounds of coke to hundred weight of coal; no clinker; no carbonic oxide in regenerative flues.

TWO AND THREE-LIFT TELESCOPIC GASHOLDERS,

With Wrought Iron Tanks, constructed above ground, of any magnitude.

Condensers, Scrubbers, Purifiers, Bench Castings, Roofs, Boilers, Etc.



The Wilkinson Water Gas Process.

Introducing the Munich Regenerative Furnace for Coal Gas, we find on the part of many Gas Companies the desire to combine to a greater or less extent an efficient system of making high candle power Water Gas; and with a view of enabling this to be done WITHOUT EXCESSIVE CHARGES FOR PATENT RIGHTS, ETC., we have acquired, by purchase, the exclusive right to construct all the Water Gas Apparatus under the valuable "Wilkinson" Patents.

The results obtained by this Process are far better than those obtained by any other apparatus, especially where an illuminating gas of high candle power or a fuel gas of intense temperature is required.

The Process is uninterrupted, making gas of uniform quality and quantity. Its greatest advantages are maximum production with minimum material and labor, combined with great durability of apparatus.

The Process is in successful operation at the works of the N. Y. Mutual Gas Company, New York; Consolidated Gas Company, Baltimore, Md.; the Hudson County Gas Light Company, of Hoboken, N. J.; and at Rye, N. Y.

We shall be glad to give further detailed information upon application.

Sole Agents for the Celebrated Hazelton Boiler.

BARTLETT, HAYWARD & CO.

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NATIONAL GAS LIGHT AND FUEL COMPANY,

No. 218 La Salle Street, Chicago.

THE SPRINGER SYSTEM

OF

Fuel and Illuminating Water Gas Works.

REFERENCES.

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Elgin National Watch Co.	Elgin, Ill.
C. R. I. & P. R. R. Shops	Chicago, Ill.
Decatur Gas Light and Coke Co.	Decatur, Ill.
Niles Gas Light Co.	Niles, Mich.
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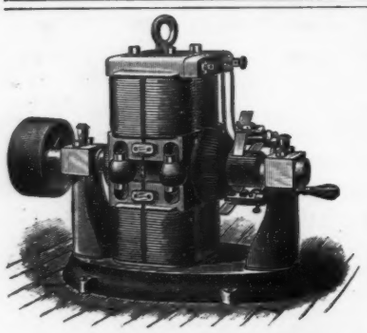

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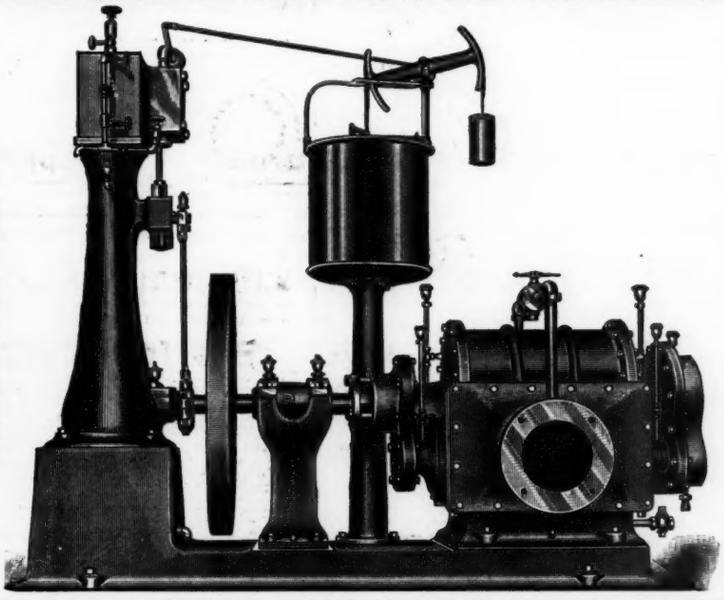

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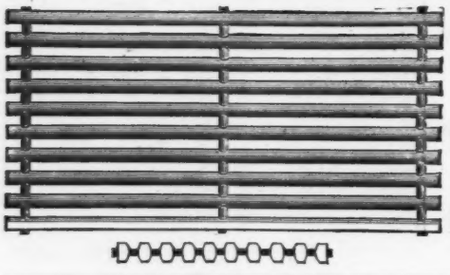

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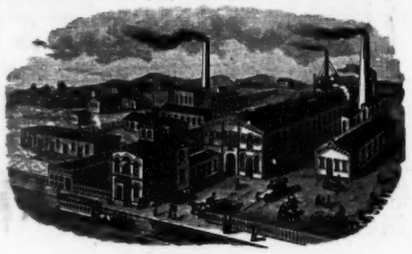

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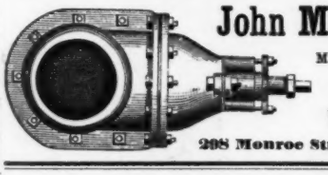

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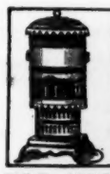

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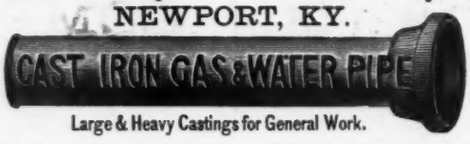

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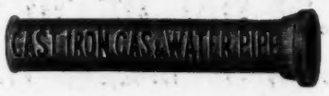

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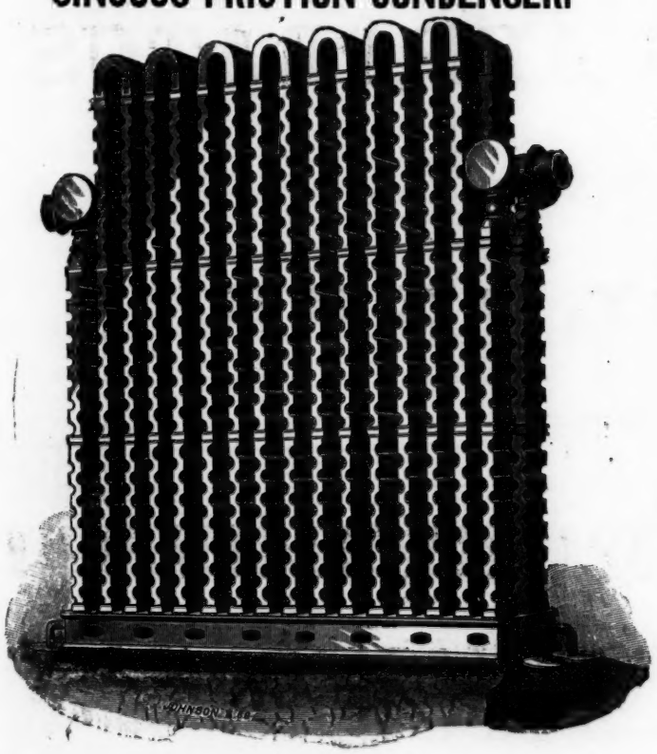

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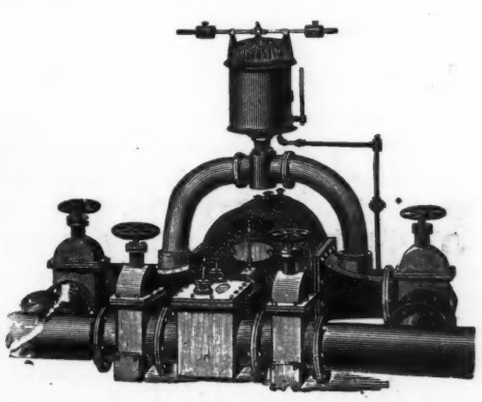

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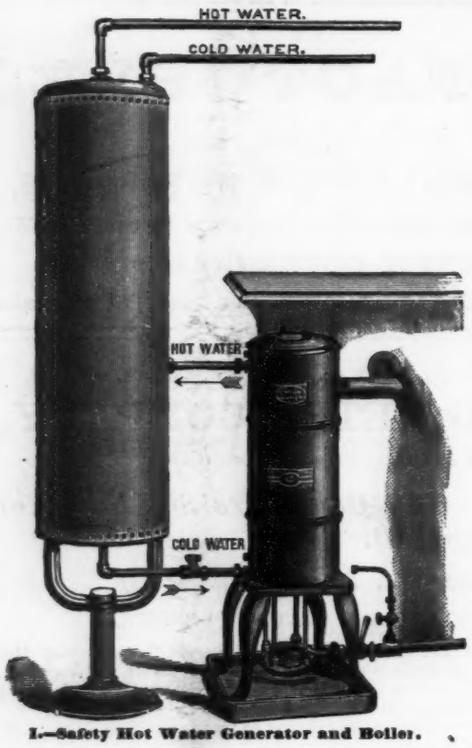
"SUN DIAL" GAS STOVES

The Most Economical, Efficient, and Durable Gas Stove Made.



I.—Safety Hot Water Generator and Boiler.

II.—Gas Cooking Stove No. 8 B.

Safety Hot Water Generator and Boiler.

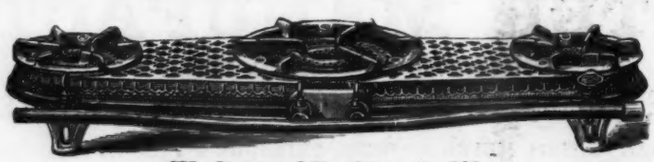
Cut I. represents our Safety Gas Hot Water Generator and Boiler, arranged for home use. This most easy, quick, and economical way of preparing a warm bath, or for heating water for any domestic purpose, entirely supersedes any necessity for the use of ranges or stoves—a great comfort, particularly in hot weather. The boiler being self-filling, as the hot water is drawn off, can never become empty, thus preventing the possibility of any accident.

We beg to call attention to the cast iron pan which is now attached to the legs of the Generator (see illustration). This is to catch the drippings from the Coil, which many persons suppose come from a leak, when in fact they are produced by condensation. This condensation caused by the hot flame coming in contact with the coil filled with cold water.

New Style Gas Cooking Stove.

Cut II. represents our New Style Cooking Stove. As will be seen, it has an ornamented cast iron base and front, and extension shelves. The oven burner, which is atmospheric (unless otherwise ordered), is of an entirely new and improved pattern (patent applied for). The ovens are of greater capacity than those of the old style. The top, in conjunction with the outlet pipe, is designed to carry off all products of combustion; hence the outlet pipe must be connected with a flue, or the stove will not work properly.

This Stove has 4 boiling burners in top of hot plate. All fittings are nickel plated. We making this style of Cooking Stove in the following sizes—viz., No. 7 B, No. 8 B, No. 9 B, No. 10 B.



III.—Improved Hot Plate, No. 108.

New Style Hot Plates.

Cut III. represents our New Style of Hot Plates, of which we are making No. 106 (two small boiling burners), No. 107 (two medium sized boiling burners), and No. 108 (two medium and one large boiling burner). See new Catalogue and Price List for further particulars.